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ABSTRACT

Phase 2 of the study of the Wisconsin Elementary Teacher Education Project evaluates the development, operation, and transfer feasibility of the proposed program (ED 036 678). It is organized in four major parts. Part 1 includes the introduction, a description of the total format and statements of individual program elements--communications, mathematics, science, social studies, safety, health, leisure, art, music, physical education, screening, orientation, guidance education, media and technology, educational psychology, educational policy studies, curriculum and instruction, early childhood education, cultural diversity, and special education. Part 2 discusses the benefits to be derived from the program as they related to learning principles, teacher effectiveness, and retention of students and teachers. Part 3 describes the various support systems vital to the development and operation of the program. Assessment, management, faculty inservice education, technological resources, and research facilities are discussed, as well as future planning for teacher education, and the research potential and benefits of the program. A related document is SP 004 262. (MBM)

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Final Report
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Contract No. OEC-0-9-590421-4046

WISCONSIN ELEMENTARY TEACHER EDUCATION PROJECT

Volume V

FEASIBILITY STUDY: PROGRAM AND SUPPORT SYSTEMS

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PREFACE

The Wisconsin Elementary Teacher Education Project (WETEP) is an extensive inclusive undertaking designed to create new patterns for teacher education. The project began in December of 1967 and is being planned for full implementation during the 1975-76 school year. The project is planned in three phases. Phase I, completed in March, 1969, was concerned with the development of detailed specifications for the various components of the instructional program. The work of the first phase is represented in the first four volumes of the WETEP series. The present report is the result of extensive efforts during the eight-month period between May 1, 1969 and December 31, 1969. Phase III implementation is intended to span a period from 1970 through 1976.

Phase II of the WETEP program is a feasibility study focused primarily on the extension of specifications delineated in the first four volumes, in the identification of benefits to be derived from the implementation of those specifications, in the definition of support systems required for an operational WETEP, in the pricing of development and operation of WETEP, and finally in an economic analysis designed to determine the feasibility of the total project. The total Phase II Feasibility Study is reported in Volume V (Feasibility Study: Program and Support Systems) and Volume VI (Feasibility Study: Pricing and Economic Analysis).

Although economic analyses of a variety of projects in the public sector have in recent years become increasingly essential, little effort in this direction in educational projects has been in evidence. The implications of the extensive feasibility study directed toward the economic analysis of WETEP are far reaching. The extensive involvement of faculty, staff, and students in education, in school finance, in economics, and in the central administration of the University attests to the anticipated impact of this study throughout the university community.

The successful development of WETEP will continue to require support from a large segment of the University faculty and administration, although the essential responsibility for the nature of the WETEP project resides with the WETEP faculty. Other resources beyond those available from within the University structure have been organized to give leadership and support to various aspects of the project. One such resource is represented by the State Department of Public Instruction and the school systems which have become a part of the enlarged cooperative WETEP effort. Radio Corporation of America is committed to continuing support in the development and implementation of WETEP beyond the planning stage and feasibility study to which they have contributed in a variety of significant ways.

This report is a result of the cooperative efforts of numerous faculty and staff members associated with WETEP. Many of these persons are identified as WETEP committee members in the staff listing. Others are identified as authors of specific reports included in these volumes. Nonetheless, many persons, including authors, consultants, readers, editors and typists have not been credited with their special contributions to the success of this project. Our indebtedness to each of these is recognized and our appreciation is expressed to all who have assisted in whatever way.

Special mention should be made here of the contributions of Deanne Olsen and Mary Krohlow as copy editors for many of the papers in Volumes V and VI. Appreciation is also expressed to Paul Knipping for his excellent service as staff photographer. Special appreciation is expressed to Jan Jones who has served as secretary and office manager for WETEP since its initiation twenty-five months ago.

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December, 1969

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INTRODUCTION

M. Vere DeVault and John M. Kean

The present analysis of the model teacher education projects has afforded the faculty and staff of the Wisconsin Elementary Teacher Education Project opportunities to systematically evaluate the contributions of the proposed program to larger educational and national objectives. The feasibility studies have resulted in a concern for the efficiency with which the program addresses both immediate and future educational needs. The goals of WETEP have shifted from the desire to model a predetermined individualized program of teacher education to a more general interest in continually exploring methods of providing the best personalized program possible with available public support.

Rapid social and technical change are producing expanded demands upon education simultaneously with a growing public reluctance to increase educational finances. Excellence in educational opportunities must therefore come in part from more efficient and effective uses of educational resources including student time. Education has demonstrated a reluctance to engage vigorously in systematic evaluation and innovation; the call for proposals to develop model teacher education programs reflected the growing belief that better education might be produced by radically new techniques. The Wisconsin Elementary Teacher Education Project is conceived not only as a demonstration device but also as a program of research and innovation in educational methods and practices.

Parallel economic changes also suggest the need for systematic analysis of educational practices. The growing cost of faculty and staff and the development of efficient methods of mediated instruction suggest that more extensive reliance upon technology might both improve the quality of education and stabilize rising costs. The program of individualized, mediated instruction envisioned in WETEP affords the basis for continuous research into capital-labor substitution and related issues of optimal resource allocation.

The WETEP staff is conscious of the stochastic nature of future educational and social developments. The needs of the economy, polity and social system in the future are predictable only in very general terms. Similarly, patterns of public support for education, the emergence of competing demands for public resources and the structure of future relative prices can only be approximated. The dynamics of educational goals and resources suggest the need to develop a program of educational innovation which is highly responsive to these changes. This analysis has underscored the need for a management system which will facilitate continuous evaluation and adaptation of the program to manifest and anticipated needs.

The failure of education to respond as efficiently as it might to opportunities for innovation in teaching methods, staffing patterns and media too often reflects an inherent conservatism of education. This conservatism grows out of the highly decentralized structure of educational decision making; the right to do ones "own thing" is perhaps the most jealously guarded prerogative of educators, especially those in higher education. Proposals to effect major changes in the teacher education program might be expected to encounter critical institutional resistance; the analysis has afforded the opportunity for staff and faculty to become involved in these innovative decisions and hence provides insights into the institutional feasibility of the project.

The Phase I and Phase II WETEP studies have demonstrated the willingness of University of Wisconsin faculty and staff to embrace a radical program of educational reform. A lengthy tradition of innovativeness has characterized the School of Education at the University of Wisconsin. The School has lead in the introduction of intern clinical experiences, interdisciplinary studies in education, and certification by examination, reflecting faculty determination to seek constructive change. The Phase I and Phase II exercises have demonstrated again this commitment of the teacher education faculty to innovative programs; the support and commitment of the entire University has been manifest by financial support from the School of Education, Graduate School and Office of the President and by cooperation and consultation from the faculties of Letters and Science, Agriculture, and Engineering.

The Phase II study of WETEP was charged with the responsibility for evaluating the development, operation, and transfer feasibility of the proposed program. This analysis has in addition embraced the task of examining the economic efficiency of the proposed program. These exercises have dramatized the important problems that will be encountered in developing and operating the program. In addition, they have produced a consciousness of the problems of effective management of the project and a concern for the efficient use of economic resources in producing desired educational outputs. A more comprehensive management system, a continuous economic analysis program, and an expanded utilization of studies of future educational goals and resources have been designed in response to these insights. The more significant changes in project specifications are reviewed here; the reader will note in examing the earlier Phase I proposal that these Phase II reports suggest some shifts of emphasis within WETEP.

Three evolutionary changes evident in the two sets of published reports and in more than 150 staff-circulated memoranda should be mentioned.

First, individualization which was a prominent notion in our earliest discussions and writing has been supplemented by a focus on "personalization," a concept within which provisions for individualization are made. This change reflects a nascent interest among faculty members over a two-year period as well as a response to a more global development in education--a moving away from an individualization concept springing mainly from independent study modes. While independent study maintains a significant place in WETEP instructional designs, the newer emphasis on personalization offers a more appropriate balance between independent and socializing modes of instruction.

A second evolutionary change concerned the design of WETEP as a context for modeling teacher education programs. The faculty initially saw its task as designing a program which when operational would include a demonstration center where interested professionals might observe. As staff members became more concerned about the possibility of WETEP becoming an inflexible program, (designed in 1968-70, operational and obsolete in 1975) the need to resolve this problem became obvious. The modeling concept itself seems to serve the purpose of assuring the continued improvement of WETEP.

A third evolutionary change is related to management. As the complexity of WETEP was revealed, a sophisticated management system became essential for all aspects of development and operation. Thus the requirements for a major management system are analyzed in the feasibility study of WETEP.

Organization of the Phase II Report

Writing a report for an audience with diverse professional concerns and academic perspectives presents some special problems. It is expected that this report will be read and used by professional educators, school administrators, educational technologists, economists and others concerned with education. For this reason, the language used throughout the report is as non-technical as possible. Authors have used descriptive phrases in place of technical terms in order to facilitate access to the studies by interested persons. The lack of formality that results from the use of non-technical language appears justified in view of the diversity of the audience being addressed.

The report is organized into four major parts: Part I includes the introduction, a statement concerning the total WETEP program format including statements about benefits associated with specific program elements, and a discussion of benefits to be derived from the total program.

Part II delineates various support systems vital to development and operation of WETEP. Assessment, management, faculty inservice, technological resources and research facilities are discusses as well as the study of futuristics as it relates to WETEP.

Data associated with systems of Program, Planning, and Budgeting comprises Part III. This section includes cost figures for preparing students in the present and new programs, marginal expenses, and costs for implementing the program on other campuses.

Part IV is given to an economic analysis of WETEP. In this analysis, every effort was made to provide an objective view of the total program. WETEP faculty worked to separate the analysis from the rest of the developing report. At the same time, faculty members thought it was essential for the total report to reflect a cost-benefit analysis position. It was important that our economics staff assisted and supported us throughout preparation of the report. Our economics analyst worked with the staff on organization and content of the early reports. In the final stages, he was careful to segregate preparation of the economic analysis from the work on other parts.

ABSTRACT

The Wisconsin Elementary Teacher Education Project is committed to achieving excellence in elementary education through systematic innovation and continuous evaluation of the teacher education program. The implementation of fundamentally new approaches to teacher education provides the opportunity to adopt techniques and staffing patterns which have heretofore been missing in teacher education. WETEP was conceived in December, 1967 as a demonstration project; the preliminary studies of program specifications and objectives are presented in Volumes I through IV of the WETEP publications series. Phase II analyses of the feasibility and efficiency of the model program have produced a growing awareness of and concern for the significant potential of WETEP as a demonstration project. Volumes V and VI report the results of extensive Phase II studies conducted during the period May 1 through December 31, 1969.

The Phase II analysis of WETEP was charged with the task of investigating the feasibility of the program proposed in Phase I. The project was directed to examine the institutional, management and economic feasibility of the original program specifications. These analyses have in addition afforded opportunities to consider the efficiency of the project; research into the problems of program implementation have been supplemented with investigations of the relationship between program objectives and present and future resource requirements. The study of project feasibility has been supplemented as completely as possible with analyses of the economic efficiency of the program. The problems of economic analysis of an educational project have suggested the need for research in education which incorporates a concern for effective use of educational resources. This concern is manifest in revisions of the model program and in development of expanded support activities which in addition to facilitating the educational program assure the timely flow of research and management information. The results of the Phase II studies of WETEP are reported in Volume V, Feasibility Study: Program and Support Systems and Volume VI, Feasibility Study: Pricing and Economic Analysis.

The feasibility study of WETEP reveals that a program of personalized instruction for elementary teachers produces formidable problems of institutional acceptance, management and resource costs. The proposed program radically restructures traditional institutional and faculty roles and functions; hence, requiring extensive planning of new structures and incentive systems in order to induce enthusiastic acceptance by the implementing institution. Analyses of the management feasibility of the program suggest that sophisticated management systems will be required in order to manage efficiently instructional programs, student time and educational resources.

The feasibility study of WETEP has been supplemented with an economic analysis of the program. Economic studies of public sector activities have become increasingly common as a means of assuring more effective allocations of scarce resources. This analysis is the first comprehensive investigation of the economics of teacher education known to the project staff, it attempts to assure that resources allocated to the project are used in such a way that the maximum educational benefit may be obtained. In addition the economic analysis attempts to evaluate the social utility of increasing the level of support to model teacher education programs. The economic analyses of WETEP have profoundly influenced the redesign of program elements and support activities. Attempts have been made to develop cost-effective methods of achieving program objectives and to assure that the operating program will generate economically relevant data hence facilitating the systematic development of better, more effective educational programs.

The Phase II analyses of WETEP suggest that the proposed program places unusual demands upon both educational technology and management sciences. Viewed as a research oriented innovative program, WETEP offers unusual opportunities to evaluate technology, to refine knowledge about individualized, mediated and personalized instruction and to devise more efficient and effective technological and management systems. Many of the economically inefficient aspects of the project reflect the primitiveness of our understanding of effective use of features of the model programs and the need to refine further the relationship between personalization and technology in the individualization of instruction. The Wisconsin Elementary Teacher Education Project offers a promising, productive device for researching more effective and efficient approaches to education.

VOLUME V

FEASIBILITY STUDY: PROGRAM AND SUPPORT SYSTEMS

PART I

THE WETEP INSTRUCTIONAL PROGRAM

The WETEP instructional program was specified in the first four volumes of the WETEP report. Part I of the present volume summarizes the specifications in a manner which facilitates the pricing and economic analysis studies.

A major task undertaken in this part of the report is to design instructional program specifications in a manner which permits gradual evolution from the present program to a fully operational program in 1975-76. These program specifications begin with an assumption that the new program will evolve out of the present teacher education program and that continuous feedback and evaluation will dictate the nature of that evolution. WETEP specifies a major emphasis on goal determination by individual students. This emphasis requires that a major portion of the instructional activities be provided within a context of free selection by the prospective teacher. One of the major questions of the evolutionary aspects of WETEP is concerned with the extent of this free choice within the program. Initially, approximately twenty per cent of the program is opened for such choice but it is anticipated that as faculty and students become increasingly experienced and knowledgeable concerning the advantages and the mechanisms for permitting freedom of choice the amount will be altered accordingly.

Finally, Part I concludes with a major section devoted to the description of each instructional element, the benefits which are expected to be derived from the implementation of that element in the WETEP program, and the benefits to be achieved from the utilization of the various modes which are included in each specific element. Each of these sections is organized around the following topics:

1. Introduction and Abstract
2. Program Benefits
3. Types of Instructional Modules
4. Instructional Mode Benefits

THE WETEP INSTRUCTIONAL PROGRAM

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10/11

Introduction

The nature of our present society demands that schools become more efficient, more effective, and more directed to the goals which are relevant to that society than is presently true. Schools adequate for the decade past cannot serve the needs of the decade ahead. School planning for today must look ahead to the needs of the future. Reflecting the demands of a technological society for person-oriented emphases, WETEP is designed to provide a teacher education program for the years ahead which will prepare teachers to serve new roles in new learning environments.

Nature of the Instructional Program

The WETEP instructional program emphasizes student involvement in a personalized learning environment.[1] The quality of personal contact between faculty and students is to be improved through the use of seminars and individual conferences. Modern technology is to be utilized to provide ready transmission of information to individual students,[2] to provide improved liaison between campus instructional activities and laboratory/clinical activities in the schools, to make available to students a greater variety of learning experiences than has been previously possible, and to provide for an instructional management system which will facilitate organizing and monitoring student progress through the program.[3] Major emphasis will be placed on building a program which will optimize student choice in the establishment of learning goals, learning resource modes, and learning rate.

Many benefits are expected to be derived from such a program which is congruent with the changing needs of society. Of paramount value is the extent to which students themselves come to recognize that teacher education is relevant to the education of boys and girls in the schools and that increasingly, education is relevant to the nature of society. It has been amply demonstrated that students alienated from the major instructional focuses in higher education seek relevancy in a variety of activities, many of which are not directed toward the original goals of that education. Designed to respond to the professional requirements of individual students, WETEP is expected to attain a strong commitment from students in the program.

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[1] "Introduction," WETEP, Vol. I: Position Papers, School of Education, University of Wisconsin, Madison, Wisconsin, 1969, p. 1.

[2] Charles Sullivan, Meredith Ames, Maurice Iverson, and Mina Ghattas, "The WETEP Media and Telecommunication System," WETEP, Vol. I: Position Papers, p. 95-101.

[3] Albert H. Yee, "A Cybernetic System for WETEP: A Model Design for the Preparation of Teachers," WETEP, Vol. I: Position Papers, pp. 47-75.

The variety of learning resource modes available by choice of the student, and available for repeated exploration of a single topic, provides a benefit in terms of the effectiveness of meeting essential objectives of the program. Associated with the assessment capabilities of the program as a monitor of student achievement, the time required to attain student identified objectives will be lessened, making possible exploration of additional areas of specialization in professional education.

The extent to which WETEP successfully teaches prospective teachers in the way it is hoped that they will teach, provides a major benefit of the program. Much of the instruction in present day classrooms, even some of the best instruction,[4] is mechanical in nature and does little to humanize personal relationships in the school. The establishment of strong personal aspects of the teacher/learner relationship should be a high priority in our schools. The separation of learning in the classroom as something apart from life itself represents a major problem in our schools. WETEP is designed to contribute positively to the establishment of strong personal aspects of teaching in a variety of ways. Most important is the heavy emphasis placed on seminars and personal conferences. The Guidance Education Element contributes substantially to this goal as it serve both the personal and psychological needs of learners and prepares them to serve such needs of learners in their classrooms.

The management system of the WETEP program offers a variety of benefits. Of major importance is the manner in which it is designed to monitor the success pattern of specific modules so that a continual program of revision and renewal can be maintained. Renewal potentials will also make it possible to alter the nature of any given module to keep it up-to-date with research and development in that area.

Instructional Elements

The instructional elements of the WETEP program may be divided into several categories. First, there are those subject areas which represent major content components in the present elementary school program (Table I). The WETEP elements include:

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[4] Philip Jackson, The Teacher and the Machine, University of Pittsburgh Press, Pittsburgh, 1968.

Communications
Mathematics Education
Science Education
Social Studies Education

Communications is seen as a new and refined focus in both the elementary school and in WETEP. Bringing together the language arts, reading, children's literature, and speech with the additional recognition of communication as central to the educative process, this element provides the focal point of the instructional program.[5] The other major content area elements provide the student with opportunities to understand the role of each in the instructional program even as the flow of research and development activities effects changes in these areas. Continuous renewal of instructional modules within these and other elements provides the students with the best that is known about educational programs for elementary school people.

Subordinate content components in present elementary school programs include:

Health Education
Safety Education
Leisure Education
Art Education
Music Education
Physical Education

Although these areas have been a part of the elementary school program and the teacher education program for several decades, they have seldom been integrated into the total program in either instance. WETEP is designed to make these disciplines an essential part of the teacher education program. Increasingly, the importance of these areas of study is being recognized. In a world of ever lengthening hours of non-working time, leisure education in its many forms assumes a new importance in the schools and the society. The appreciation of the arts is an appropriate adjunct to leisure education goals. The importance of understanding the role of drugs, smoking, and specific health hazards speaks for the need to assume responsibility for effective education in these areas.

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[5] Margaret Ammons, "Communication: A Curriculum Focus for WETEP", WETEP, Vol. I: Position Papers, pp. 25-41.

Supporting elements essential to the effectiveness of WETEP include:

- Screening
- Orientation
- Guidance Education
- Media and Technology
- Educational Psychology
- Educational Policy Studies
- Curriculum and Instruction

These supporting elements permeate the content elements by providing clinical experiences (within Curriculum and Instruction), understanding of and expertise in the utilization of media materials and equipment, appreciation for the guidance role in instruction, an understanding of human development and learning, and an awareness of the relation between society and the responsibility of the school.

Finally, WETEP elements devoted to specific groups of learners provide a focus for examining some of the crucial problems facing the nation. WETEP intends a significant impact on the improvement of educational opportunities for young children, for the culturally diverse, and for children with physical and mental handicaps through programs specially designed in the following elements:

- Early Childhood Education
- Culturally Diverse
- Special Education

The program in Early Childhood Education focuses attention on the preparation of teachers for children ages three through six. Special attention is given to the relation between preparation programs in this area and those in the culturally diverse area, as well as in supporting elements and through the elements representing the content areas in the elementary school. The Culturally Diverse Element is directed to the preparation of teachers for the ghettos and for the Indian population of Wisconsin. This is appropriate in Wisconsin since these are disadvantaged populations of major concern in the state. Culturally Diverse elements in WETEP-type programs in other areas of the country might quite naturally focus on the problems of different minority groups.

The problems of the American Indian are common to many states but have received little attention. Similarly, the development of an effective program to prepare teachers to cope with the problems of teaching in an urban ghetto is an almost universal need. Although the ethnic, cultural, or racial group might differ by locale, the modular design of WETEP provides for changes to accommodate such differences in needs.

Instructional Modes

WETEP instructional modes are designed to provide an instructional environment which places major emphasis on the personal interaction between the student and the instructional staff. The instructional modes can be organized into three major groups. The first group of modes emphasizes personal interaction; the second emphasizes a wide variety of media; and the third emphasizes clinical and field experiences.

Personal Interaction. The WETEP program places great emphasis on personal interaction between faculty and students. This interaction is essential at two levels, the psychological and the cognitive. At the psychological level, personal interaction will ensure that the student has control over his professional educational program and that his objectives are the basis for the structure of his program. At the cognitive level, personal interaction will assist the student in making sense out of the information he assimilates in independent study, and in understanding the relevance of the program to his long-term goals.

WETEP will utilize several instructional modes which stress personal interaction between faculty and students: individual conferences, seminars, and small group conferences. Individual conferences are integral parts of instructional sequences. They enable both the student and the faculty to make continuous appraisal of the progress being made by the student. They also serve to assist the learner in developing in-depth understanding of the material under study and/or of himself in relation to that topic in his work with elementary school children.

In addition to scheduled conferences which are a part of the instructional modules, faculty and staff will be continually available for student-initiated conferences directed to problems associated with instructional material, the student's developing concept of his own role as a teacher, or his perceptions of teaching as a profession. These student-initiated conferences will be closely associated with the student's work in the Guidance Element so that his perception of the guidance role of the teacher will be modeled for him by instructors in professional education working with him.

Seminars are an essential ingredient of the WETEP instructional program. The management system monitoring the progress of students will form temporary instructional groups whose members are ready for common exploration of ideas. The benefit of the frequent utilization of seminars will come from the faculty input and direction of student exploration and from the student-student relationships which these seminars foster. Independent study, which is central to WETEP and which provides an opportunity for individual pacing and sequencing of learning activities, will be personalized by means of these small-group seminars. Even though continuous assessment is provided by several instructional modes, students need an opportunity to test ideas, to explore rationales, to explain reservations, and to derive inspiration from the thoughts and ideas of their peers. Seminars provide students with the opportunity for this kind of sharing under the guidance of the instructional staff.

Large group instruction will be used minimally in WETEP. The greatest use is in the elements of the Input Component. Undergraduate freshman and sophomore instruction on large university campuses is typically carried out through lecture classes, many of which may have several hundred students enrolled. The Input Component is designed instructionally to acquaint students gradually with the personalized nature of WETEP without alienating them by thrusting them immediately into a complex and unfamiliar environment characterized by requirements of individual decision making and independent study. The class meetings designed for the Input Component, composed of Screening and Orientation Elements, will provide students with their initial contact with the WETEP purposes, design, requirements, and staff. These large group sessions will be carried out in close association with small group discussion and with individual conferences. On the basis of these initial activities, students will decide whether to enter the professional teacher education program. At the same time the staff will have an opportunity to make decisions relative to the admission of individual students.

Some WETEP elements use large group instruction as a means of acquainting students with the nature of instruction within that element. This introduction provides students with an overview of the independent learning aspects of the instructional program and with the staff who will, through seminars and individual conferences, assist them in their study within that element. Whereas these prospectus sessions might easily be conducted as individual, dial-access sessions in a study carrel, the large group method has the advantage of presenting both the overview of content and instruction and the persons who will be most responsible for instruction and guidance in that element.

Laboratory/clinical experiences represent another aspect of WETEP in which personal interaction is the essence of the instructional mode. In WETEP the laboratory/clinical experiences are carefully designed to facilitate student-instructor interaction throughout the learning experience. Particularly through microteaching experiences the role of the instructor will be to help the student perceive the nature of his interaction with learners, his own needs for continued improvement, and the establishment of a carefully designed sequence of follow-up activities which will assist in meeting his objectives.

Mediated Instructional Resources. A wide variety of media will be used in the WETEP instructional program. Traditional learning resources such as books, journals, and other library materials will be an essential ingredient of the instructional program. Slides, audio and video tapes, programmed instruction, and computer-assisted instruction provide the modes for additional independent study activities within WETEP. This variety of independent study modes is essential in relating media to kind of learning and to choice of the learner. Not all kinds of learning are most effectively and efficiently accomplished through use of the same kind of materials for a given learner, nor is the same material equally effective or efficient for different learners as they pursue the same instructional objective. The WETEP model program has been carefully designed to provide the appropriate learning resource for a given individual.[6] The instructional program will initially use materials selected on the basis of certain theoretical assumptions, and the effectiveness of particular instructional materials will be continually assessed and subject to revision through the empirical testing of research hypotheses.

Field Experience. All WETEP elements rely heavily on field experiences in some form. Most elements use the most extensive field experience as a part of the internship. In each element, classroom observations of children and of teachers are also integrated into the instructional program. The kinds and amounts of field experiences are dependent upon the requirements of the modules composing the individual student's professional education sequence. The variety of schools associated with WETEP makes it possible to provide internship experiences appropriate to the professional goals established by each student.

Field study experiences are most prominently designed into the Culturally Diverse Element. Students preparing to teach either in the ghetto or in predominantly Indian schools participate in an ecological field study during which they live for a week with an Indian or Black family. This experience provides the benefit of helping the student learn of reality in the life of the student he would teach. The youthful zeal with which many students make decisions concerning their professional direction is too often based on a romantic conception of Indian or Negro life in our society. The ecological field study provides an educational experience essential to the student if he is to make lasting and appropriate decisions.

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[6] John M. Kean and Margaret A. Sterner, "Benefits of Systematically Relating Objectives and Instructional Media Through Appropriate Applications of Learning Principles," WETEP Feasibility Study, Vol. V: Program and Support Systems.

Instructional Program Specifications

WETEP will be implemented over a five-year period as instructional materials are prepared and management and technological components are made available as resources. Implementation procedures are the subject of the next section, but it is important to understand the dynamic nature of the development plan in interpreting the instructional program specifications.

Instructional Element Utilization

In structuring the curriculum for WETEP, the faculty designed the new program using the context of the current teacher education sequence as a point of departure. New elements have been added and student time involvement with others has been altered. Table I indicates the amount of instructional time in each element expected to be available to students and provides a basis for comparison of the present requirements and those projected for WETEP. Present time was determined on the assumption that a student spends two study hours out of class for every hour in class. For a two credit course meeting two hours per week, a student would spend a total of six hours per week in class and study time. In sixteen weeks, then, a student would spend 96 hours for a two credit course. Under present requirements, a student spends a total of 2272 class and study hours in the professional education sequence. Because of the necessity of liberal arts studies for the WETEP student, it is anticipated that professional education requirements must remain within the present hourly limits. The initial element specifications reflect this position.

The data in Table I support the high priority that the faculty has given to Communications in the WETEP program. At the same time, not less than twenty hours of study have been devoted to each element in the Subordinate, Supporting and Special Content Areas. Within the basic program, 530 hours are reserved for elective study from among the elements to permit both choice and an area of specialization. Hours of instructional activity designated both for specialist study and for in-service education are also identified in Table I. It should be reemphasized that the proportions presented in Table I represent preliminary goals. They may be altered as available evidence suggests throughout the development years.

Implementation of the Instructional Program

The WETEP faculty has designed a dynamic development and implementation plan that will enable WETEP to evolve from the existing teacher education program. The benefits of such an approach are many but can be identified under three main headings. First, maintenance of simultaneous programs will be avoided. Having a second or new program under development, or experimentally underway with some

TABLE I

WETEP ELEMENT TIME ALLOCATIONS*

Elements	A Current Program Time (credit/hrs.)	B WETEP Basic	C Program Specialist	D Time In-Service
Major Content Areas				
Communications	5/240	230	185	90
Mathematics Education	2/ 96	80	115	50
Social Studies Education	2/ 96	80	115	50
Science Education	2/ 96	80	115	50
Subordinate Content Areas				
Art Education	1/ 48	30	135	65
Music Education	1/ 48	30	65	35
Physical Education	1/ 48	30	85	45
Health Education	3/144	45	80	40
Safety Education	-	20	65	35
Leisure Education	-	20	65	35
Supporting Content Areas				
Screening	3/144	7½	-	-
Orientation	-	117	-	-
Educational Psychology	4/192	113½	170	80
Guidance Education	-	30	135	65
Media and Technology	-	23	85	45
Educational Policy Studies	3/144	96	-	-
Curriculum and Instruction	12/736	650	100	50
Special Content Areas				
Early Childhood Education	-	20	115	50
Culturally Diverse	-	20	150	75
Special Education	-	20	115	50

* All times expressed in student activity hours.

students, would divide commitments, resources, faculty, staff and student. The total faculty responsible for elementary teacher education will assume responsibility for both the operating program and the evolving plans and developments for changing that program. Second, many advantages accrue to a current program while long-range plans are being developed. Thus, dial-access facilities, improved approaches to screening and orientation, ecological field experiences and initial approaches to the individualization of instruction in selected elements may provide benefits to a program and students prior to full WETEP implementation by serving as instructional resources as soon as they are available. Finally, the evolving program yields continuous feedback which provides a flow of information essential to the refinement of operating portions of the program and the preparation of undeveloped portions.

In the initial year of development it is anticipated that five modules will be prepared for implementation during the second year. During the second year, a larger number of modules will be under development. Feedback following the first year of implementation will contribute to decision making concerning both revisions of the implemented modules and the nature of new modules under development and in planning stages.

The dynamic character of this development plan is in keeping with the cybernetic system which is the model for WETEP program operation. Modeling requires that goals be set and that procedures be identified by which these goals are to be achieved. Within a systems approach, modeling also implies that both the product and the process of the system undergo continuous evaluation. It is in the context of that continuous evaluation that the faculty accepts the model represented in Table I as a point of departure in curriculum design for teacher education within WETEP.

Instructional Mode Utilization

WETEP instructional modes are designed to provide a total learning environment which places major emphasis on the personal interaction between student and instructor. A careful delineation of the role of each mode within each element has provided a tentative design which optimizes the complementary roles of personal contact, media in a variety of modes, and field experiences. Table II, drawn from the specifications of the various elements, summarizes the time proportions of the WETEP instructional modes.

Within elements the proportions of time spent in instructional modes vary considerably as purpose and content require. For instance, a portion of large group instruction takes place in the Orientation Element at a time when the student is coming from his General Education work to his first experiences within Professional Education. It is anticipated that large numbers of students will take this initial element even though a relatively small percentage of students are then

TABLE II

TIME TO BE USED IN EACH INSTRUCTIONAL MODE

Instructional Mode	Basic		Specialist	In-service
	Number of Hours	Per Cent of Time	Number of Hours Available	Number of Hours Available
Personal Interaction				
Conferences	80	5.0	105	55
Seminars	300	18.0	334	103
Large Group	42	2.5	2	1
Lab/Clinical	58	3.5	150	114
Sub-total	480	29.0		
Instructional Resources				
Reading	205	12.5	220	153
Video Tapes	75	5.0	75	67
Films	70	4.0	50	22
Slides	36	2.0	20	20
Audio Tapes	24	1.5	25	20
Interrelated Modes	37	2.0	25	18
Programmed Instruction	64	4.0	53	34
CAI	38	2.0	31	22
Sub-total	549	33.0		
Field Experiences				
Classroom Observation	97	6.0	101	23
Field Study	35	2.0	132	30
Clinical Experiences	65	4.0	99	38
Sub-total	197	12.0		
Other Modes				
Laboratory Work	250	15.0	330	97
Independent Study	125	8.0	95	64
Miscellaneous	45	3.0	48	49
Sub-total	420	26.0		
TOTAL	1646	100.0		

chosen or choose to enter the instructional component of WETEP. Within the Social Studies Element, however, no large group instruction is anticipated, and the instructional emphasis is on the use of small groups and individual conferences supplemented by the various media and laboratory or field experiences.

The following subsections discuss in detail the rationale for instructional mode utilization patterns within WETEP.

Personal Interaction

(1) Conferences. Beginning in the Orientation Element, where conferences are a necessary supplement to large group instruction, conferences will become increasingly important as the student progresses through the teacher education program. In the Orientation and Screening Elements the conference serves two purposes: first, it provides an opportunity for the student to clarify with an instructor his understanding of the WETEP program, of the role of school and teacher in the education of boys and girls, and of himself as a potential teacher; second, the conference provides the faculty with a personal knowledge of the student. This personal knowledge provides a base for helping the student and the staff make a decision about the individual's continuing education within or outside of teacher education.

In those elements representing the Teaching/Learning Component of WETEP, the conference provides a continuing opportunity for the student to test his ideas, to seek assistance in determining sequence, and to explore meaning derived from the various modes he is utilizing independently. A significant aspect of the conference at this point in the program is the opportunity for the student to investigate educational ideas in concert with a professional educator. It is at this point that an essential role of the teacher on the WETEP staff, that of modeling behavior, is clearly and repeatedly demonstrated for the student.

Finally, during intern teaching, the proportion of individual conference time is greater than at any other time in the program. Only the time spent with elementary school children will exceed conference time during this period. Thus, the student experiences an ever-increasing proportion of individual conference experiences as he moves semester by semester through the program. This process is designed to increase understanding by the student of various aspects of his professional education, including his understanding of the role of conferencing in instruction.

(2) Seminars. The largest proportion of time for any single instructional mode within WETEP is the seminar. Individualized instruction as it was perceived by many during the early 1960's was essentially independent study. Experience with these programs has

indicated that students need a continuing interaction with their peers under the leadership of competent instructors. This interaction provides an opportunity for students to explore the meaning of the content they have been studying independently and to set and test hypotheses with the benefit of the advice of peers and instructor.

From these seminars much of the continuing motivation for study within WETEP is to be derived. Students will have explored a given topic from a variety of points of view. One may come to a consideration of discovery learning through work in mathematics, another through social studies, and still another through health. As a part of the Educational Psychology Element the student learns of discovery theory and later discusses the implications of his work with others. Out of these discussions comes evidence of additional areas of study to explore, other content areas in which to investigate implications, and additional modes of study to utilize.

The seminars also provide an opportunity for the instructors to assess the progress a given student is making. It is possible, then, to suggest conferences for some, mediated instruction for others, and assessment activities for still others. The seminar serves as a continuing instructional and assessment device which is widely utilized throughout the WETEP program.

(3) Large Group Instruction. Large group instruction in the usual pattern of higher education is used minimally in WETEP. Most large group instruction is centered in the Orientation Element at which time there will be large numbers of students ready for essentially the same instructional content. That is, they have expressed an interest in learning about elementary education and the teacher education program, and they have selected this course of instruction. Notwithstanding the great variety of backgrounds students bring to teacher education, they are more common in their interests and understandings at this point than they will be at any future time as they proceed with the design of their own professional educational goals and program sequences.

Another instance in which large group instruction is anticipated is at announced times throughout the semester when a sequence of meetings will be held to provide a prospectus relative to a given element or set of modules. It is anticipated that a prospectus for the Communications Element, for instance, which involves language arts, reading, speech and children's literature, might be designed to be introduced to relatively large groups, numbering perhaps thirty students, who in the near future will be entering work in that element. Such a prospectus would provide the student with an understanding of the purposes and goals of the element, an overview of the organization and structure of the element, and an acquaintance with staff members who will be working with the students as they pursue studies in that element. It is proposed that in many of the elements a mediated prospectus will be provided. In several others, such as Communications, the large group approach will be used.

Instructional Resources

(1) Reading. Journal articles, textbooks, and other printed materials will provide an essential part of the student's instruction. These reading materials will be carefully integrated into the sequence of instructional experiences designed by the WETEP staff. In some instances it is anticipated that students will do wide reading of a general nature in a given area, but most of the time included for reading in Table II is expected to be spent with reading directed to a specific purpose and in a particular sequence of instructional activities. Where student choice of instructional mode is available, reading may be one of the choices available to the student. In some cases, reading may be the only feasible way of presenting a particular kind of information, and in those instances all students at that point in the sequence will read instructional materials.

(2) Video Tapes. Video tapes offer the most accessible form of presenting many of the necessary examples of classroom settings required in the WETEP modules. At a relatively low cost, video tapes can provide a flexible formula for bringing real experiences in school life and learning to the student in a campus classroom. Because programs vary within the schools and change over time, it is essential that provision be made within WETEP to keep classroom illustrations up-to-date in two dimensions. First, it is important that students see examples of classroom work which are congruent with the classes in which they will be observing and interning, and second, it is important that as new developments in elementary school programs emerge, illustrations of these programs become available to students. Video tape can provide for both of these needs. Video tape also provides an opportunity for microteaching experiences and for the filming of school settings by individual students for presentation and discussion in seminars and in conferences.

(3) Films. The large number of commercially available films of high quality represent an essential bank of resource materials available to students. These materials are in most instances funneled directly into specific points in the instructional sequences, and students are directed to the films for rather specific purposes. This specificity of purpose is much more direct in the use of films than in the use of the video tapes which are expected to be available in large quantities from which students might select materials to serve their particular purposes.

(4) Slides. Slides will be used at a number of points throughout the program, usually in association with other instructional materials or devices. Slides included with computer facilitated instruction will be one use of such materials. Slides with automated audio tape will provide another combination which will have some use in the program, particularly in the prospectus sessions of many elements, subelements, and modules.

(5) Audio Tapes. Audio tapes have their greatest value in bringing to the campus directly and inexpensively the voices of individuals who have specific contributions to make. The Culturally Diverse Element makes use of audio tape in recording the voices of persons in the Indian communities or in the ghettos. The Communications Element will include taped examples of dialect exemplars, and of gifted artists in interpretative readings. The tape recorder is excellent for capturing interviews to provide material for seminars and conferences on the campus. The use of audio tapes is also anticipated in the Social Studies Element where both historical and current event materials can be recorded for use in the instructional program.

Audio tapes are expected to be of particular value as resources for review. Frequently, students will have studied particular prerequisite modules weeks or even months before the assessment for that prerequisite is made for entry into a module. If learning does not meet the requirement, it is expected that audio tape utilization of compressed speech will provide this review in a fraction of the time originally required without the need of re-entering the prerequisite module.

(6) Interrelated Modes. Instructional modes are viewed as interrelated in two ways. First, they are seen as interrelated when they are experienced simultaneously by the student as in the slides and audio tape, and second, they are seen as interrelated when they are in constant interaction as is proposed in some elements for computer-assisted instruction. In the CAI, a film may reinforce material which has already been presented, or the CAI will be used following the filmed sequence.

(7) Programmed Instruction. Programmed instruction activities are not concentrated in a single element or in a few, but are scattered rather generally throughout the instructional program. They are included in different elements, however, for a variety of reasons. In the Mathematics Element, for instance, programmed instruction is included because there are a number of elementary school programs which utilize some aspects of PI. Student use of PI materials will facilitate understanding of the principles and practices of programmed instruction. On the other hand, there are several elements which have identified content of a relatively factual nature for which programmed instruction is the most efficient mode of instruction.

(8) Computer-Assisted Instruction. Closely associated with Programmed Instruction is computer-assisted instruction (CAI). CAI encompasses all those computer formats--drill and practice, tutorial or dialogue--where content interaction with the student takes place. The Mathematics Element makes some use of CAI in part because this instructional mode has been used more extensively in elementary school mathematics programs than in other elementary school areas of study. The Screening Element has used CAI because it provides the opportunity

to record student responses as information about the program is provided. This response information is viewed as being of particular value as the student and staff together make decisions concerning the student's admission to WETEP. In the Safety Education and Educational Psychology Elements, content has been identified for which CAI is particularly appropriate.

Field Experience

(1) Classroom Observations. Throughout the program, classroom observations are an important part of instruction. Initially these observations serve as a way of familiarizing students with the elementary school classroom. Through facilities made available in the telecommunications system, closed circuit TV provides a continuous opportunity for general observation of school activities. During much of the instructional sequence the various elements provide opportunities for students to view classroom activities directly related to the topic of the current study. These observations may be live or may be viewed by the closed circuit TV system.

About mid-point in the program, the student begins to observe his own teaching as he is working with groups of children in the schools. Video tapes processed through the telecommunications systems afford the perfect medium for the use of such observations for self and tutorial assessment. Observation of self for the finishing student and the continuing student in in-service education provides essential aspects of the educational activities of the WETEP teacher.

(2) Field Study. Field study activities are at a minimum in the basic requirements of WETEP students. Several elements, however, utilize field experiences extensively in the specialization aspects of the program. The Culturally Diverse Element includes a major ecological field study experience during which time students live with a family either in the Indian communities of Wisconsin or in the ghetto communities of selected Wisconsin cities. The Art Education, Safety Education, and Leisure Education Elements use field study experiences in the collection of data in various communities, in making observations and visits to locations off campus, and in visits and short-time study arrangements with government agencies. A portion of the field study activity is directly related to the intern teaching experience which is identified with the Curriculum and Instruction Element.

(3) Clinical Experience. The clinical experiences are centered principally in the Curriculum and Instruction Element during the intern period. The intern experience is a semester-long involvement in a variety of activities, but direct work with children is the essence of the experience. Much of the time for the intern experience is represented in Table II in association with a variety of instructional modes. During the intern semester, when the clinical experiences are

foremost, the student has available most of the instructional materials resource of WETEP through the telecommunication system. Conferences and seminars are a major aspect of this period, as are such independent studies as may be associated with the intern clinical experiences.

Other Modes

(1) Laboratory Work. Most of the elements are designed to include some use of laboratory work in association with other instructional modes. Science Education places a particularly heavy emphasis on this mode of instruction. Mathematics Education, Social Studies, Safety, and others include in the specifications for the WETEP program activities and facilities designed to provide laboratory work.

(2) Independent Study. A major portion of the effort of the student in the WETEP program will involve independent study as he pursues work with the various instructional modes. The category Independent Study, however, implies that he is working outside the context of directed or choice activities prescribed or suggested in the instructional program. Time spent at the library in the exploration of a topic or concern is identified within WETEP as Independent Study. Reading activities identified as a specific assignment associated with a module are represented in Table II as Reading, whereas the reading undertaken by the student outside the WETEP structure is identified as Independent Study. This study mode is of major importance within the program for it affords the student an opportunity to get away completely from the designed program and, through self-study with or without the assistance of staff, acquire new perspectives as he continues to pursue the WETEP professional sequence.

(3) Miscellaneous. The miscellaneous category is composed of activities which are included in only one or two of the elements. These are many in number but minimal enough in terms of total student time to warrant their joint classification as miscellaneous. Nonetheless, within their respective elements they are perceived as being very specific and of major importance to that particular area of study. For example, a period of sensitivity training in the Orientation Element is considered an important aspect of instruction at that point in the student's planning for teaching. Testing children and analyzing records are of particular significance in the Educational Psychology Element and are identified as Miscellaneous instructional modes. In the Art Education Element, time devoted to the observation and viewing of art is identified separately from other instructional modes and is included in this category. Apart from the benefits derived from the use of each of these modes within particular elements, the use of such a category provides a flexibility in planning which avoids the misinterpretation that the WETEP program is limited to those major instructional modes which are used widely throughout the program.

ELEMENT PROGRAM AND MODE BENEFITS

WETEP Staff

30/31/32

COMMUNICATIONS

Thomas C. Barrett and Carl R. Personke

Introduction and Abstract

Communications is ". . . a two-way process in which one individual intends that a particular meaning be grasped by another. . .and in which others grasp the intended meaning."[1] It may be achieved by writing, speaking, gesturing, dramatizing, composing one's own messages, interpreting the messages of others, reading, listening or using modern media. A child's ability to communicate is critically important for several reasons. 1) Communication is essential to both communal and individual learning. 2) Communication may be one of the activities in which we engage with the least skill.[2] 3) Maintenance of the fabric of our society may be dependent upon communication.[3]

The Communications Element of WETEP is designed to develop in teachers an understanding of the competence needed to help children express themselves in many ways and understand the expressions of others. Some of the assumptions about the learner which are central to the element are:

a) Each child's communication functions are unique and may require different sequences of learning experiences;

b) Each child uses a dialect. There are others that he can acquire if he needs them;

c) Each pupil seeks communication experiences consistent with his maturation level and interests;

d) The ultimate goal of communication is to maximize the child's interactions with other people and to permit him to have access to the thoughts, activities and values of the people of the world.

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[1] Margaret Ammons, "Communication: A Curriculum Focus for WETEP," WETEP, Vol. I: Position Papers, School of Education, University of Wisconsin, Madison, Wisconsin, 1968.

[2] Ladislas Farago, The Broken Seal, Random House, New York, 1967.

[3] "Is Insurrection Brewing in the U. S.?" an interview with Richard H. Sanger, author of Insurgent Area, U. S. News and World Report, December 25, 1967, pp. 32-37. The ideas suggested here are developed in greater detail in Ammons, op. cit.

The Communications Element is closely integrated with other major elements in WETEP. The programs proposed in other elements contribute to the development of the teacher's philosophy and competence in many areas, but communication remains the central focus of all learning. Knowledge of body movement as defined in the Physical Education Element contributes significantly to the understanding of the process used by the child in acquiring language. Knowledge of curriculum development as specified in the Curriculum and Instruction Element contributes significantly to programs and environmental settings conducive to a child's self-expression.

The Communications Element is composed of four subelements: Theoretical Structures, Developmental Programs, Assessment and Diagnosis and Environment.

Program Benefits

1. In the first subelement, the prospective teacher becomes knowledgeable about the evolution of the theoretical structures of communication, the physiological as well as the psychological and sociological factors that influence the communication process of elementary pupils. For example, a teacher gains understanding of the interrelationships that exist among language processes and the changing nature of instruction in communication. This understanding assists the teacher in developing a flexible attitude toward the language patterns of his pupils, an important step toward building a truly individualized program for each one.

2. The second subelement introduces the WETEP student to developmental programs in communications, e.g., the influence of individual differences on school programs and the interactions which may exist among the disciplines. Through this subelement the WETEP teacher will develop a sensitivity to the individual behaviors of pupils which reflect a readiness for different levels of development in each communication process. And he will become aware of the contributions of communication to growth in the other academic disciplines.

3. In the third subelement, the teacher learns to use the processes of assessment and diagnosis to determine pupils' levels, needs and competencies. The study of evaluation techniques is more critical in the WETEP curriculum than it has been to teacher education programs in the past. To the WETEP student, evaluation is presented as the determination of the progress of an individual child toward specified objectives. Techniques to be employed include sensitive

observation of children by teachers, and thorough, comprehensive record-keeping. The WETEP student sees true evaluation as a learning experience for the child and not as a judgmental experience. He sees it as an opportunity to assist each child to develop his potential. He uses it as a chance to gather information with and about each child so that the pupil may see himself in relation to goals set by both himself and others. The philosophy of this approach to assessment, diagnosis and evaluation constitutes one of WETEP's prime contributions to teacher education for the future.

4. The fourth subelement establishes an environment for the recognition and use of communication in varieties of social-cultural settings. A major problem in current elementary school programs is the fragmentation or splitting of the child's academic world into unrelated parts. The WETEP student becomes committed to the concept that the purpose of elementary education is to assist the individual child to cope with his world as he finds it. The teacher learns to see communication as a legitimate core around which to plan the program of the elementary school. He knows, uses and evaluates a wide variety of instructional materials that will facilitate a pupil's communication competencies.

Types of Modules

The structure and organization of modules is closely related to the objectives of each subelement. Therefore, types of modules will be discussed under subelement headings.

1. Theoretical Structures Subelement. Modules in this subelement make extensive use of reading and films as direct and effective means of transmitting information to students designing their own individual modular sequences. The free exchange of thoughts, so beneficial to the internalizing of theoretical concepts, is provided for in frequently scheduled seminar sessions, permitting close contact between students and faculty members.

2. Developmental Programs Subelement. This subelement relies heavily on work in the communications laboratory, where the relevancies of communications to other academic areas are explored and various school programs and the influences upon them of individual differences are studied. These modules also involve extensive lab-clinical experiences, giving teachers opportunities to work with children and explore pupils' different levels of readiness within each communication process.

Presentation of the various developmental programs in communications is made by means of interrelated modes offering a variety of approaches to the role of communications in the curriculum. Modules from the Curriculum and Instruction Element are applicable to this subelement and may be considered prerequisite to or concurrent with it.

Follow-up seminar sessions are also provided to facilitate the exchange of ideas integral to the developmental programs subelement.

3. Assessment and Diagnosis Subelement. In these modules, it is essential that the WETEP student realize that evaluation is not judgmental, but is rather a technique to show pupils what they still have to learn. To accomplish this objective, frequent seminars permit the exchange of philosophical ideas. Techniques of record-keeping and of observation-recording are practiced in periodic laboratory sessions, as well as with children during clinical experiences. Reading assignments cover information on standardized tests, measurement instruments and individualized pupil profiles.

4. Environment Subelement. The content of these modules is concerned with the materials and the physical surroundings of the learning processes. The subelement makes the WETEP student aware of the principles for the preparation of teacher-made or pupil-made learning materials. It also acquaints him with various school organizational plans. Considerable time is spent in the communications laboratory, learning to use a wide variety of instructional materials to facilitate a pupil's communication competencies. Extensive use is made of new media--film, video tape, audio tape and interrelated modes--as the prospective teacher learns to identify elements in instruction, in the instructional environment and in the school's organizational structure, that facilitate communication learning. Small group seminars and individual conferences with faculty members assure the students frequent opportunities for personal interaction.

Instructional Mode Benefits

The instructional modes utilized in the Communications Element represent departure from the traditional large-group lecture type of university presentation. This element is characterized by individual sequencing of modules and, within the modules, on individual choice of instructional events, designed to increase student motivation by increasing academic relevance. Practical experiences contained in the communications laboratory are reexamined and articulated in seminars and personal conferences with professors. The use of films and tapes permits graphic, sensory presentation of all aspects of communication.

In its coordination with all other subject matter areas, the Communications Element serves to illustrate that the ultimate goal of communication is to maximize the child's interactions with other people and to permit him to have access to the people of the world.

At the same time it must be recognized that this element continues to utilize group instruction, in sizes ranging from five to thirty students, more than most WETEP elements. Communications is by definition a social process. Although many cognitive and affective objectives can be attained through individual study, talking to a computer or viewing a video tape is not the same as social interaction. Therefore, at various times students studying in the same modules are given the opportunity to come together to share ideas, present a play, engage in choral speaking, or participate in any of the many oral language activities which are important parts of the elementary school curriculum.

MATHEMATICS EDUCATION

J. Fred Weaver

Introduction and Abstract

In discussing the aims of education, Alfred North Whitehead said, "What education has to impart is an intimate sense for the power of ideas, for the beauty of ideas, and for the structure of ideas, together with a particular body of knowledge which has peculiar reference to the life of the being possessing it."[1] Mathematics is a discipline ideally suited to serving these aims of education, provided that it is effectively taught. This requires that elementary school teachers must understand the power, beauty and structure of mathematics and the means of communicating these characteristics of mathematics to their students.

The WETEP Mathematics Education Element is designed to provide teachers with these competencies through a program which relates the disciplines of mathematics, curriculum and instruction and other areas of study, to the teaching of mathematics in the elementary school. The weakest part of the mathematics elementary school curriculum appears to be the lack of understanding and competence of the classroom teacher. Inadequate teaching may result not only in a low level of understanding and competence in mathematics skills, but perhaps more importantly, may be detrimental to the pupil attitudes which are retained into advanced studies and adult life. WETEP is designed to improve students' understanding of and attitudes toward mathematics and mathematics education which will be beneficial to the pupils they teach.

The Mathematics Education Element consists of five subelements: 1) Discipline of Mathematics, 2) Rationale and Objectives for an Elementary School Mathematics Program (ESMP), 3) ESMP Mathematical Content and Related Abilities, 4) ESMP Instructional Strategies, Materials and Media, and 5) Evaluation of Outcomes of an ESMP. Although these subelements constitute the Mathematics Education Element, instruction within the element is directly related to additional educational resources and elements. The most important of these is Educational Psychology which provides the basic psychological information necessary for successful study in Mathematics Education. Educational Psychology and Mathematics Education in turn serve as resources to other elements such as Early Childhood Education, the Culturally Diverse and Special Education.

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[1] Alfred North Whitehead, The Aims of Education, The MacMillan Company, New York, 1929.

Program Benefits

The following program benefits are provided by the Mathematics Education Element:

1. A close monitoring system assures that prerequisite understanding of mathematics content is attained prior to use in instructional methods sequences. One of the major problems in the present teacher education program in mathematics is the lack of effective relationships between content and methods.[2] WETEP is designed to encourage:
    a. greater understanding on the part of students, as well as those who build the program, of the specific content needed for effective work in various methods of mathematics education,
    b. better student understanding of how their work in mathematics content is related to mathematics programs in the schools,
    c. better student focus of attention on problems of mathematics teaching methods, resulting from more adequate grasp of content,
    d. more efficient achievement of the purposes of methods of work which may result in less frustration associated with mathematics, and thereby improve attitudes toward mathematics as a school subject,
    e. improved attitudes on the part of teachers which may result in improved attitudes on the part of elementary school pupils.[3]
2. A balance is offered between specified modular learning sequences and free choice for the individual student.

    A major need in the present elementary education program is an improved way of meeting the needs and interests of individual students. WETEP makes it possible for individual students to select from a large array of resources those which they think are of immediate value. The basic essentials within mathematics education are specified as prerequisites to modules. The determination of these prerequisites and of certain sequences is the responsibility of the faculty. Yet within this array of opportunities, students make many choices which give direction to their study. The benefits of such student choices are two-fold. First, beyond the essentials in mathematics education the student is able to study those topics or those illustrations of principles which are of most interest to him. Second, such choices have an impact on the attitudes of these prospective students toward mathematics education.

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[2] Goals for Mathematical Education of Elementary School Teachers, A report of the Cambridge Conference on Teacher Training, Houghton-Mifflin, Boston, 1967.

[3] John Fisher, "Extent of Implementation of CUPM Level I Recommendations," The Arithmetic Teacher, March, 1967.

3. Repetition of subject matter is eliminated through cooperation with other WETEP elements.

   It is widely recognized that present teacher education programs in all areas, as well as in mathematics, often include much repetition and that professional education courses are often unrelated. The WETEP systems approach facilitates a close working relationship among the various elements of the teacher education program. For mathematics this relationship is especially important with Educational Psychology, Science and Special Education. The reduction of repetition which previously was part of the program will make it possible for students to devote the time they invest in professional education to areas not previously included and provide additional time to give to their area of specialization.

Types of Instructional Modules

Within the context of the Mathematics Education subelements, five exemplary types of modules are described.

1. One type of exemplary module involves essentially the transmission of information. Students learning about the content of various elementary school mathematics programs may learn through reading, programmed instruction, video tapes, audio tapes, slides or computer-assisted instruction. One large group meeting may be scheduled for an overview presentation. Subsequent personal contact between students and faculty will take place in small group seminars and in individual personal conferences.

   A significant amount of time is allotted, particularly for mathematics specialists, for independent study of the many different organizations of mathematical content.

2. Learning to use appropriate instructional strategies in another group of modules, students make extensive use of technological teaching techniques. In these modules, a variety of media modes are employed, computer-assisted instruction, films and video tapes. There is one large group overview session followed by a student choice of modes, readings or programmed instruction. Considerable time in these modules is spent in independent study as students familiarize themselves with a spectrum of appropriate instructional strategies and media. Laboratory-clinical experiences serve to illustrate to students the types of instructional situations in which media may effectively serve.

3. In learning about the varieties and uses of instructional materials, students will again receive a general overview in one large group session. In these modules, a great deal of time is spent in the mathematics laboratory, experimenting with games and varieties of manipulative materials. Reference to many textbook series is also made possible. For illustrative purposes, use is made of films, slides and video tapes. Small group seminars and private student-faculty conferences are scheduled in these modules for the exchange and clarification of ideas.

4. Intrinsic to the Mathematics Education Element is the utilization of research findings to build up and improve upon present mathematics instructional programs. In learning to evaluate and use research in the field, WETEP students read a representative amount of relevant research, evaluate it in extensive independent study and synthesize it in small group seminar sessions.

5. WETEP students become knowledgeable about techniques and instruments that may be used to evaluate outcomes of elementary school mathematics programs. In learning to relate assessment items to specific learning objectives, students approach assessment techniques from several points of view. Readings, programmed instruction and computer-assisted instruction may all serve to reveal evaluation techniques. Considerable time spent in independent study is followed by faculty-student seminar sessions and conferences.

Instructional Mode Benefits

The instructional modes selected for use in the Mathematics Education Element have been chosen because of the unique contribution which each mode may make to particular learning objectives. Because the modes are so closely related to objectives, in this section the use of modes will be discussed on the basis of their potential contribution to the element.

The instructional strategies utilized in the Mathematics Education Element rely on a continual interweaving of independent study on the part of the student with personal interaction between groups of students, instruction in seminars and individual conferences with the instructor.

Films and videotaped materials provide a major portion of the media content of the element. It is anticipated that some of these materials will be selected from those which are commercially available. Others will have to be developed and produced within the WETEP context.[4] In the transmission of content these modes are efficient and motivating.

Laboratory and clinical experiences are an essential part of the Mathematics Education Element. These experiences begin early in the student's study and initially involve observation of classroom practice through the telecommunication system. In these initial observations the student is on campus and the classroom children are in cooperating schools. Live visitation in the schools is followed with microteaching directly related to specific study topics as contained in the instructional module. Throughout the element there is a four-way interaction between (1) study through audio-visual media, (2) printed information sources, (3) clinical and laboratory experiences including microteaching, with constant reference to the student's previous study of both mathematical content and educational psychology, and (4) personal contact through seminars and individual conferences. In this manner there is an orderly progression from vicarious, simulated experiences to guided field practice.

Computers play a particularly significant role in the Mathematics Education Element for at least two reasons. First, some aspects of mathematics are amenable to computerized treatment because of the relative ease with which topics may be sequenced to insure adequate treatment of prerequisites. It is anticipated that during the development period of WETEP, the Mathematics Education Element will make extensive use of computers. Secondly, the mathematics education instruction will focus to some extent on computer utilization because it is in mathematics that schools are doing some of their early instructional work with computers.[5] It is anticipated that students' use of computers in this area will be extended in many schools in the near future.

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[4] Committee for Economic Development, Innovation in Education: New Directions for the American School, New York, July, 1968, Chapter 3, Section 3.

[5] Patrick Suppes, "The Uses of Computers in Education," Scientific American, September, 1966.

SCIENCE EDUCATION

Calvin W. Gale

Introduction and Abstract

Many innovative practices have aimed at the individualization of science instruction in the elementary schools,[1] but little has been done to provide individualized programs of instruction for the preparation of elementary science teachers. Prospective teachers, like children, exhibit variability along many dimensions, among which are knowledge of science concepts and processes, intelligence, creativity, age, sex, social understanding, social conformity, psychomotor abilities and skills, attitudes toward children, attitudes toward science, self-image, curiosity, cognitive skills, attitudes toward learning, poise, compassion and knowledge of the science teaching-learning process.

Greater efforts to design and implement programs of individualized instruction for prospective elementary science teachers would seem to be desirable for these reasons:

1. Each prospective teacher should be offered opportunities to develop his teaching capabilities to the limit of his potential.

2. Each prospective teacher should become knowledgeable and skilled in the techniques of individualized science instruction. The modes of such instruction should be understood by these prospective teachers so they can apply the techniques in their work with elementary children. It is assumed that such understanding can be achieved most effectively through active participation in a program of individualized instruction.[2]

The Science Education Element of WETEP is designed as a teaching-learning system focused on the individualization of instruction effected through the application of systems analysis techniques

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A summary of techniques and methods is provided by Raymond J. O'Toole, "Individualized Elementary School Science," Science Education, October, 1968, pp. 376-380.

Paul F. Brandwein has shown that few science teachers take advantage of instructional methods other than lectures in "Observations on Teaching," The Science Teacher, February, 1969.

combined with computer management technology. Thus it is designed to offer the student a variety of choices relative to learning environments, the uses of instructional media and instructional modes.

While it is neither desirable nor possible to model in any specific way the ideal elementary science teacher, certain desirable teacher characteristics may be described, and in this way an operational definition of an effective science teacher can be set down. In WETEP, the effective teacher of elementary science:

- understands the conceptual structures of science and the mechanisms by which this structure is generated.
- understands the role of science in the life of an individual and of society; he also understands the role of society in the life of science.[3]
- has formulated a philosophy of science teaching.
- has a favorable attitude toward science and science teaching.
- can identify, define and solve science related problems.
- possesses a knowledge of and ability to use a variety of science teaching methods and materials.
- recognizes and understands the need for a program of instruction designed to deal with variability among children.
- desires to improve the science teaching process.

These desired teacher behaviors comprise the general objectives for the element and are grouped to form three subelements. The subelements are: Philosophy, Process, and Method. The subelements in turn consist of several modules, each of which focuses upon a major program objective. The program provides for great flexibility in student movement through the system. Not only may the student select the order of entry to the modules, but he may also reenter modules at his option. The system is non-linear; it is highly probable that no two students will trace identical pathways through the system.

Many activities in the Science Education Element will be coordinated with activities in such elements as Curriculum and Instruction, Educational Psychology, Early Childhood Education, Culturally Diverse, Mathematics and Social Studies. Most of the objectives of the Method Subelement describe the behaviors in terms of teacher-student interactions. Much of the instruction of this subelement must necessarily be carried on within the context of, or at least related to, such clinical experiences in the Curriculum and Instruction Element as simulation, microteaching, classroom observation and intern teaching.

The necessity for perceiving the role of science in relation to the total needs and characteristics of society has been articulated by Jacobs Bronowski in Science and Human Values, Harper and Row, New York, 1965, and by Kenneth E. Boulding in The Meaning of the Twentieth Century: The Great Transition, Harper and Row, New York, 1964.

Program Benefits

The modeling of the Science Education Element as a system permitting flexibility within the program and individualization of instruction through the use of alternative instructional modes yields the following benefits:

1. Parts of the instructional system may be redesigned without disrupting the entire system.

2. The element provides a continuous assessment of the student.

3. The element acts as a vehicle for the investigation of the science teaching-learning process, of the various science teaching methodologies and of the characteristics of learners.

4. The element provides a variety of science teaching exemplars and optional enrichment activities.

5. The element program precisely states behavioral objectives, thus permitting the careful delineation of minimum, optional and extended levels of performance for the science teacher.

6. The element structure and organization provides for the establishment of relationships between science teaching and the foundational areas of Educational Psychology and Educational Policy Studies. It also provides for closer coordination with related elements such as Mathematics.

Types of Modules

Modules within the Science Element are of three basic types which parallel the three subelements. Therefore, the discussion of module types will be presented within the context of each subelement.

Modules within the Philosophy Subelement have as their basic purpose the transmission of information. An important secondary purpose is fostering positive attitudes towards science education and building a philosophy of science education. Thus, modules utilize a wide variety of media to transmit information. Faculty-student conferences and seminars permit examination and discussion of the ideas presented in the subelement.

Modules within the Process Subelement have as their purpose ascertaining the ability of students in particular topics which are important to science education and relating these skills to the teaching of science. Therefore, they are characterized by close coordination with modules from other elements, principally Mathematics, with an emphasis upon laboratory work. The flexibility of the Science Element is particularly evident in the diversity of instructional options available to students in the Process modules.

The Method Subelement involves the application of learning from the first two subelements to the principles and practice of teaching. While parts of the subelement will require the mastering of discrete bits of information, the modules of this subelement will focus on simulation techniques, microteaching, practice in decision making and clinical experiences. Faculty conferences will provide personalized guidance for prospective teachers.

Instructional Mode Benefits

The determination of instructional modes for each module has been made to reflect the philosophy that individualization of instruction and learning in science can best be accomplished within the concept of an educational system offering as options to the student a variety of learning environments, teaching methodologies and competency level goals at each stage of instruction.

The application of systems analysis techniques to facilitate educational description, combined with the use of computer management technology, will permit a high degree of individualization within the teaching-learning processes. Presently the university science education faculty devotes a disproportionate amount of its time and energy to the solution of routine program and instructional problems. Furthermore, the validity of these solutions is often limited by the lack of adequate data and by the lack of specificity of the curriculum. Given a situation in which there is sufficient data describing individual students' characteristics and educational progress, combined with a curriculum delineated in great detail, the individualization of instruction and learning can be appreciably increased.

Laboratory activities are an important part of the instructional program in the Science Education Element. Aside from their importance in giving prospective teachers experience in working with scientific concepts, they are designed to encourage creativity in the use of resources and the preparation of instructional materials.[4]

Microteaching experiences, planned in coordination with the Curriculum and Instruction Element, will permit WETEP students to relate activities within the Philosophy and Process Subelements directly to teaching.[5]

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[4] Donald W. McCurdy, "Are Science Teachers Making Adequate Use of Their Instructional Resources?" School Science and Mathematics, April, 1969.

[5] Marjone Gardner and Rolland Bartholomew, "Microteaching: A Medium for Modifying Teacher Behavior," The Science Teacher, May, 1969, pp. 45-47.

SOCIAL STUDIES EDUCATION

B. Robert Tabachnick and Keith G. Hogle

Introduction and Abstract

The term "social studies" was first used by Arthur W. Dunn in a report which synthesized ideas and proposals for incorporating the various social science disciplines into one curriculum.[1] Social studies were defined as those whose subject matter relates directly to the organization and development of human society and to man as a member of social groups. The social studies, according to Dunn, should develop an "appreciation for the nature and laws of social life, a sense of responsibility of the individual as a member of social groups, and the intelligence and the will to participate effectively in the promotion of the social well-being."

Recognizing the scope and intensity of social conflict in American society today, one cannot deny the need to prepare teachers to assist children in the processes of social inquiry and analysis. Traditionally, the curricula of the social science disciplines as taught in the universities of the nation have focused on "facts"--on the elements of the disciplines. Inter- and intra-disciplinary relations have been more a matter of incident than deliberate effort and emphasis. The lack of focus on such relations--on man's _true_ relation to his fellow man and his environment--contributed significantly to the distressing civil disorders of 1967 and the years following. The 1968 _Report of the National Advisory Commission on Civil Disorders_ states that:

> Despite these complexities, certain fundamental matters are clear. Of these, the most fundamental is the racial attitude and behavior of white Americans toward black Americans. . . .[2]

Teachers must develop and maintain in children a curiosity not only about the _what_ in their society, but also, and more importantly, about the _why_. The development of this "social awareness" in prospective teachers as well as in children will surely contribute significantly to our struggle for social improvement. John Dewey alluded to this social awareness when he said:

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[1] Arthur W. Dunn, _The Social Studies in Secondary Education Bulletin, 1916, No. 28_, Department of the Interior, Bureau of Education, Washington, D. C., 1916, p. 14.

[2] _Report of the National Advisory Commission on Civil Disorders_, U.S. Government Printing Office, Washington, D.C., 1968, p. 91.

> . . .Young people who have been trained in all subjects to look for social bearings will also be educated to see the causes of present evils. They will be equipped from the sheer force of what they have learned to see new possibilities and the means of actualizing them. They will be indoctrinated in its deeper sense without having had doctrines forced upon them.[3]

Included in the text of the Chairman's Report on the 1959 meeting of the National Academy of Scientists is the statement:

> . . .It is certainly plain that at the very least there will have to be energy devoted to improving curriculum and teaching in the humanities and social sciences comparable to what is now being devoted to science and mathematics. Future legislative provisions for federal and state aid to education might well include specific titles concerned with such problems, and it is none too early to consider, before appropriate legislative committees, the nature and extent of such support. . . .[4]

The Social Studies Education Element in WETEP is characterized by intimate interaction with studies in other academic areas. Study in the social sciences will be initiated early in the student's college experience. At the point of entry into the WETEP Social Studies Education Element, the student will have studied several disciplines in the social sciences. Minimal requirements for WETEP students will include work in at least two of such social science disciplines as history, anthropology, sociology, economics, political science, or geography. The understanding of major ideas in the social sciences and the development of skill in inquiry and valuing are thought of as taking place prior to a student's study about teaching particular content to children.

The three subelements of the Social Studies Education Element are closely related and are in constant interaction with each other. The sequences of learning experiences will vary from student to student across three subelements: Informing Children in Social Studies,

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[3] John Dewey, "What Is Social Study?", Progressive Education, Vol. 15: May, 1938, p. 369.

[4] Jerome S. Bruner, The Process of Education, Harvard University Press, Cambridge, 1962, p. 79.

Inquiring with Children in Social Studies, and Valuing with Children in Social Studies. Within each subelement, however, the same pattern of learning experiences will be followed in the three modules, Knowing About, Applying, and Evaluating.

Program Benefits

The purpose of the Social Studies Education Element is to prepare the student to utilize the skills and understandings of social science disciplines in his efforts to engage children in social study. The emphasis lies with process rather than with content, and employs such processes as inquiry and reflective thinking.

The Social Studies Education Element provides the opportunity for frequent and personal professor-student interaction and greater individualization of student course work. Content dissemination, traditionally the primary instructional role of the university teacher, allowed little time for the student to explore with the assistance of his teacher genuine inquiry or reflective thinking. Lawrence Metcalf noted this void when he stated that "the tendency of college professors to use methods other than the method of reflection is well established. College courses are concerned with dissemination of content and little concerned with methods of inquiry."[5]

A critical concern of those developing teacher preparation programs is the need for a more personal relationship between students and professional staff. Being relieved of the time-consuming activities involved in preparing for and conducting very large group instruction, the WETEP professor can devote a considerably greater portion of his professional time to advising individual students and to conducting seminar sessions with small groups. The student is then provided with more incentives to develop his own interests, to solve his educational problems, and to clarify misunderstandings. The opportunities afforded the professional staff for time to devote to research and publication will correspondingly increase.

The structure of the Social Studies Education Element provides an opportunity for the individual student to prescribe, with the assistance of a professor, his own program. Decisions pertaining to subelement entry, number and types of events selected, utilization of professor time, and subelement exit points are made by students in consultation with the faculty. Appropriate assessment techniques, including student-staff conferences, aid the student in determining when the desired proficiency has been attained.

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[5] Lawrence E. Metcalf, "Research on Teaching the Social Studies," Handbook of Research on Teaching, N. L. Gage, ed., Rand McNally & Company, Chicago, p. 963.

Types of Instructional Modules

Each subelement in the Social Studies Education Element contains three modules: Knowing About, Applying, and Evaluating. All modules have within them three designated levels of proficiency or sophistication: Basic, Specialist, and In-service. Work at the Basic level is required of all prospective elementary teachers. Those wishing to specialize in the social studies field complete the program through the Specialist level. Experienced teachers wishing to improve their competency in social studies complete the In-service phase.

Within any module the student is permitted a great deal of flexibility in determining his course of study. It is primarily the student's responsibility, with assistance from his instructor, to determine the sequence of events for reaching his desired level of proficiency. Pre- and post-assessments within each module, including individual interviews, assist the student in determining his competencies and deficiencies in the field and his subsequent course of study.

Knowing About. The first module of each subelement is concerned with acquiring information. Since the module serves primarily as a disseminator of information, it utilizes a variety of instructional devices such as programmed instruction, video tapes, audio tapes, and printed texts.

Applying. In these modules, the student interacts directly with children in the processes of valuing. The modules contain primarily laboratory and clinical experiences to provide students with opportunities for practical applications of their knowledge of Social Studies Education.

Evaluating. In the third type of module, the student learns to analyze his own capabilities and progress through audio and video tapes of his performance in clinical experiences.

Instructional Mode Benefits

Mediated instructional presentations, carefully and imaginatively prepared, offer a double benefit to the Social Studies Education Element. They have the capability of disseminating information effectively and efficiently. And they may free faculty members to spend more of their professional time in creative and significant activities, most important of which are seminars and conferences with individuals and small groups of students.

The seminar experiences in the Social Studies Education Element are designed to provide meaningful analysis, interpretation, and integration of previously studied content in the social sciences. Further, seminars will project continued study in those areas and lay plans for the study of teaching strategies designed to implement knowledge, inquiry, and valuing in students' work with children.

SAFETY EDUCATION

C. Frazier Damron

Introduction and Abstract

An active safety education program in elementary schools is a recognized part of the curriculum.[1] The need for a comprehensive school safety program is demonstrated by the fact that accidents are responsible for more deaths in the two to twelve age group than any other cause.[2] The skills required of a school safety supervisor have been enumerated,[3] as have the responsibilities of the elementary teacher in safety education.[4] Yet, preparation in school safety and in methods of communicating principles of safety to children has been neglected in the traditional teacher education program. The WETEP Safety Education Element provides the prospective teacher with the necessary theoretical and practical information to integrate safety education into all aspects of the elementary curriculum.

Within the Safety Education Element of WETEP are five subelements: Accidents, Rationale, Programs, Teaching and Evaluation.

Prospective teachers will learn the basic causes of accidents, understand logical reasons for the inclusion of specific safety content in the instructional program, become familiar with teaching materials and resources in Safety Education, become knowledgeable about teaching procedures which will contribute to individual learning progress, and understand various devices for evaluating pupil skills and comprehension in the field of Safety Education.

Those students choosing Safety as their area of specialization will be expected to master modules on the higher cognitive levels and will become prepared to: monitor and evaluate the accident reporting system, assess the value of essential basic research projects and successful pilot programs in Safety Education, combine desirable features of attitudinal and behavioral goals for pupils of varying ages, and evaluate assessment instruments applicable to various aspects of Safety Education.

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[1] G. H. Reavis, "Curriculum Planning for Safety," Safety Education, December, 1941.

[2] National Safety Council, Accident Facts, Chicago, 1967, p. 9.

[3] Harold K. Jack and Virginia Wheeler, "A Job Analysis for Safety Education Supervisors," Safety Education, February, 1959.

[4] John E. McGill, "Criteria for Evaluating Classroom Activities in Safety," National Safety Congress Transactions, Vol. 23, 1960, pp. 45-48.

Program Benefits

1. The elementary school is an obvious place in which to foster attitudes that result in safety-conscious behavior. The WETEP Safety Education Element is designed to communicate not only specific needs for safety instruction but means of integrating safety education into instruction in other subjects. Instructional sequences utilize media to graphically present the need for safety education and the means by which it can best be accomplished.

2. The structuring of the Safety Education Element in subelements and modules permits it to be of greater service to other portions of the teacher education program than a typical course in Safety. The Safety Education Element will offer modules on accidents and their prevention in conjunction with the Science Element, or modules on Traffic Safety in connection with Leisure Education. This program structure serves to convey the immediacy and relevance of principles of Safety to prospective teachers.

3. The Safety Element will lead the student to learn about the special Safety Education needs of all children, especially those from culturally diverse backgrounds.[5] The teacher will thus find himself in a position of being able to utilize all of his training regardless of his teaching situation.

4. A secondary program benefit is offered by the Safety Education Element in the form of assistance to public schools. WETEP students will be prepared to evaluate the safety education needs of particular schools as part of their instructional program. This information will be of immediate help to participating schools.

Types of Modules

The Safety Education Element consists of five types of instructional modes, each one reflecting the nature and purpose of the module.

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[5] A discussion of the need for various types of Safety Education is offered in Lois Clark et. al., "The 'Distinctive Role' Statement," National Safety Congress Transactions, Vol. 23, 1965, pp. 39-46. See also Bailey Bishop, et. al., "A Proposal for Decision Making," National Safety Congress Transactions, Vol. 23, 1968, pp. 85-95.

The five types of modules are 1) Overview, 2) Resource, 3) Content, 4) Clinical Experience and 5) Evaluation. Most of the subelements contain modules of two or more of these five types.

1. The Overview modules will provide students with an understanding of the extent of the accident problem. Thus, it will have a heavy reliance on the use of visual media through presentations of slides, audiotapes, films and videotapes.

2. Resource modules will make students aware of the sources upon which they can draw in designing and presenting a school safety program. Independent study will be an important instructional mode in these modules. Students will identify and study instructional resources. Seminars will provide the means for sharing of materials among students.

3. Content modules have as their purpose the transmission to the student of information on many topics related to safety, including school responsibilities and legal requirements. Readings, video tapes and seminars will be the instructional modes which transmit this information.

4. Clinical Experiences modules require that the student engage in activities similar to those which he would carry out as an elementary teacher. Indpeendent study is the mode used most extensively in these modules. Students will examine the safety problems of a particular school, plan, and, in some cases, present lessons based on the assessment of the school's needs.[6]

5. The Evaluation modules are designed to familiarize students with accident reporting forms and assessment instruments on safety topics. Seminars and conferences will supplement and serve to guide independent study in these modules.

Instructional Mode Benefits

The use of media to convey visually the need for safety education is an important factor in achieving the aims of the element. Rather than merely reading about accidents, for example, students will see simulated accidents on video tapes, prepare accident reports and then again view the video tapes. The video tapes will thus permit them to critically evaluate their own knowledge and performance.

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[6] The form which some of these activities might take is suggested by Lois Lewis in "Home Safety Instruction in Primary Grades in Middletown, Ohio," National Safety Congress Transactions, Vol.23, 1960, pp. 49-52.

Independent study is an important mode in this element because it encourages students to think critically and creatively in designing and planning school safety experiences, yet enables them to make use of WETEP resources in the form of faculty and instructional materials.

HEALTH EDUCATION

Warren H. Southworth and Paul A. Knipping

Introduction and Abstract

The Health Education Element is constructed on the premise that the improvement of health attitudes, beliefs and practices is a desirable outcome of education. In its definition of health, the World Health Organization maintains that health is a ". . .state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity."[1] Horace Mann, in 1842, suggested that health be taught in schools, and, in 1850, public health appeared as an organized movement in this country. The Temperance Movement provided a stimulus to health education, and by 1890 every state had enacted legislation requiring instruction about the effects of alcohol and narcotics. "The White House Conference on Child Health and Protection convened in 1910, and was the first of a series of conferences which have influenced all phases of school health, including health instruction."[2]

The ability of youngsters to cope with the stress of the demands and mores of society depends on the quality of their early learning experiences.[3] Existing curriculum practices have failed to provide early learning experiences to equip youngsters for healthful decision making. Research indicates, for example, that much drug abuse is carried on at the elementary and secondary school levels.

Public furor in opposition to sex education as an integral part of the school curriculum is another indictment of traditional curriculum practices. The World Health Organization states that ignorance, not knowledge, of sexual matters is the cause of sexual misadventure.[4] Moreover, Clifford Kirkpatrick's analysis of the components of successful marital adjustment ranked adequate sex information in childhood as third in importance among ten factors contributing to a successful marriage.[5] In a study by A. H. Maslow the importance of emotions and of personality factors in marital happiness and sexual adjustment is clearly indicated,[6] yet traditional curriculum patterns flourish. A need for change is illustrated by the 200% increase of VD infection among teenagers, the one in five pregnant teenage brides,[7] the escalation in divorce rates and youth's use of drugs.

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[1] Bernice Moss, W. H. Southworth, and J. L. Reichert, Health Education, NEA and AMA, Washington, 1961, p. 1.

[2] Ibid., p. 18.

[3] Hans Selyje, M. D., The Stress of Life, New York, 1956.

[4] Leslie McCary, Human Sexuality, D. Van Nostrand, New York, 1967, p. 7.

[5] Ibid., p. 7.

It is evident that curriculum changes in the field of Health Education are needed. WETEP learning activities are designed to prepare teachers who can improve and enhance the academic climate for school-age citizens through a better understanding of their health education needs. The Health Education Element is organized around five subelements: 1) Rationale, 2) Health Science, 3) Health Teaching, 4) Preventive Health Services, and 5) Healthful School Living. Educational objectives which are particularly stressed in these subelements are:

- the relationship of good physical and mental health to academic achievement and the impact of poor health on student performance.
- principles of plausible health education procedures to alleviate personal, family and community health problems.
- academic climates designed to motivate desirable human responses to health education.
- variations in human ecological factors which necessitate the preparation of a variety of health teaching programs.

Program Benefits

1. Improved facilities for effective study of such deleterious habits as drug abuse and the use of alcohol and tobacco are provided. Today's Health Guide[8] views the drug abuse problem as not being confined to college campuses, but rather as having descended to the junior and senior high school levels. The same publication suggests that there are at least 6,000,000 alcoholics. The evidence indicates that traditional teaching methods have been ineffective in altering the use of alcohol. The effects of tobacco have long been

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[6] Ibid., p. 15.

[7] W. W. Bauer, M. D., editor, Today's Health Guide, American Medical Association, 1965, p. 459.

[8] Ibid., p. 459.

publicized, but again the schools have relied upon traditional scare techniques which have not been effective. By providing an increased awareness of the deleterious effects of these substances, WETEP can prepare the teacher to more effectively combat their use among the youth of America.

2. Pre- and post-assessment techniques provide guidelines to future test construction, curriculum development and teaching design. If the attitudes, beliefs and practices of students remain unchanged following completion of the curriculum, the program has failed, and a need for immediate revision is indicated.

3. The WETEP program provides opportunities to articulate learning experiences in Health Education with Science, Educational Psychology and Special Education. The present traditional fragmentation of subject matter tends to disperse student efforts, to dilute their total learning experience and to distort their image of reality. Related areas in the above fields do exist; articulation of these similar learning experiences would emphasize their importance in the total educational experience.

Types of Modules

Within each module, the structure of the Health Education Element supports somewhat divergent but nonetheless related activities. Broadly viewed, school health activities include an overview of certain supporting basic sciences, etiology, ecology and epidemiology in preparation for classroom teaching. The provision for school health services in WETEP provides additional learning opportunities in the study of the total academic climate and the emotional and psychological factors which determine it.

Within the subelement Health Teaching, three modules have been designed to review and consider current curriculum practices, employing appropriate teaching strategies and utilizing supporting materials for the teaching of health education.

Six modules have been developed in the area of Preventive Health Services. These underscore the need for early teacher appraisal of pupil health needs and rely heavily on the use of films and seminars.

Instructional Mode Benefits

The use of particular instructional modes in the Health Element result in:

a. increased opportunities to participate in extended laboratory experiences relative to pressing problems of youth, such as drug abuse, tobacco, and alcohol. Through the use of media, these phenomena can be more realistically brought into the student's sphere of learning activities.

b. student time-saving within the program by the use of such devices as pharmacologic data by computer-assisted instruction and videotaped episodes in narcotic rehabilitation centers.

c. better management of student clinical experiences in local health agencies via the systems approach which forms the basis for all WETEP modules.

The modular design for the Health Education Element varies according to the nature of each specific task. Appropriate learning modes relate pupil activities to stated objectives. The implementation of WETEP is facilitated by the use of professionally prepared films, video tapes, audio tapes, computer-assisted instruction materials and programmed instruction, all made available to increase the base of individual programming. Instructional personnel, professional and paraprofessional, are liberated from information-passing processes to personal contacts, student conferences, seminars and observations.

LEISURE EDUCATION

H. Clifton Hutchins

Introduction and Abstract

The worthy use of leisure time has long been held as a major educational goal.[1,2] Many people still seek their personal fulfillment in their work. But for those whose work offers them no feeling of contribution or achievement, the use of non-working time is critical. This time may be referred to as leisure, the time which an individual conceives as being free and during which he may choose what he will do.

The purpose of the Leisure Education Element is to help teachers and prospective teachers to recognize this new aspect of our culture, that people may indeed have more free time available than they spend in earning a living. Leisure Education reassures an emphasis in teaching school subjects to children in a way that will let them realize the avocational potential of what they are learning.

The Leisure Education Element serves to focus the prospective teacher's attention on an aspect of our culture that is becoming increasingly important, namely the use of time for self-fulfillment as well as for economic productivity. Some of this time is devoted to recreation-seeking experiences such as may arise from the satisfaction of basic psycho-social needs, e.g., the need for affection or the need for self-expression. Some time may be devoted to learning, to work we like to do, to loafing, to thinking. But the emphasis of the element is on experiencing rather than on verbal learning. It is concerned with the development of attitudes rather than of knowledge.

The Leisure Education Element has been divided into three subelements: 1) Leisure Understanding, 2) Leisure Content and 3) Leisure Occupations. Within these subelements are experiences to be offered to all WETEP students to help them develop a positive attitude toward leisure and its use. In order for prospective teachers to be shown how people can be educated to derive fulfillment from their leisure pursuits, they must first be made aware of the areas in which they themselves excel or have aptitude or interest. Therefore, concomitant with modules in the Leisure Education Element, selected modules from other WETEP elements will be pursued.

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[1] U. S. Office of Education Bulletin, No. 35, Cardinal Principles on Secondary Education, NEA Commission on the Reorganization of Secondary Education, 1918.

[2] Educational Policies Commission, The Purposes of Education in American Democracy, 1939.

In the Music, Art, Physical Education, Science, Communications, Social Studies and Media and Technology Elements, the student participates in events which give him insight into his own talents or interests. This awareness will be of great assistance when, in the Leisure Education Element, he is called upon to assess his own understanding and use of leisure and to guide pupils in satisfying uses of their leisure time.

In addition to the preparation of all WETEP teachers for leisure education, the Leisure Education Element makes provision for the separate preparation of specialists at the supervisory level who may advance from teaching into supervision but who require specialized or further in depth preparation for giving guidance to teachers, curriculum committees, administrators, PTA's and community groups in the exploration of leisure occupations.

Program Benefits

For the Leisure Education Element, program benefits are related to each of the three subelements and therefore are discussed under subelement headings.

1. Leisure Understanding Subelement. To achieve a major aim of the WETEP program it is necessary to find teachers who have learned to enjoy satisfying experiences in their own leisure. This necessarily involves a) learning by the prospective teacher about the nature and significance of leisure and its potential for good and for evil in people's lives, b) learning about the many uses and occupations of leisure and their relations to physical and mental health and c) learning about the resources for leisure use to be found in each individual, in the community and in the natural environment.
2. Leisure Content Subelement. The Leisure Content Subelement specifically presents the student with opportunities to understand himself and his individual needs. The aim is to assist the WETEP teacher to assess his own potential for satisfying use of leisure through exploration as he will later help his students to understand themselves. Experiences in modules from other elements that afford opportunity for the prospective teacher to try out different modes of personal expression, inquire into areas of learning, explore the natural and manmade environments, and exercise leadership where there is competence, can be utilized as part of the element. These exploratory experiences in the many areas of learning open up new interests and ways of finding personal fulfillment for the prospective teacher to use in his own life and in guiding his students. Some

instructional events are constructed with cognitive objectives and are designed to enable students to learn intellectually about leisure. Another important group of events are constructed with affective and psychomotor objectives and are designed to emphasize the experiencing of leisure activities.

3. Leisure Occupations Subelement. The principal benefit of this subelement to teachers and prospective teachers is that they are made aware of pupils' needs to a) find means of expression consonant with individual talents, b) explore and foster new ways of self-expression to the point of personal satisfaction, c) be able to handle themselves in an unfamiliar environment, e.g., in the out-of-doors, or in the water. To foster this awareness, instructional modes are used to inspire these interests (observation of nature, sports, art forms) in teachers, who will in turn influence the lives of the children they teach.

   Additional benefits of the subelement are that it will facilitate the development of attitudes that enable the individual teacher to handle himself in unfamiliar environments, such as the out-of-doors, and of skills based on individual capabilities which can be developed into useful competencies for the occupation of leisure. These benefits can best be attained by emphasis on these lifelong values within many of the school subjects but particularly in science, social studies, the arts, physical education and music. Attitudes towards leisure which are developed within this subelement will be communicated to students by the WETEP teacher.

Types of Modules

In all of the modules of the Leisure Education Element, there is a reliance on personal experience and laboratory instructional events which may reveal hidden meanings of life. Primary emphasis is on the teacher's understanding of himself and his own environment. Attention is also devoted to study, observation and work with children in many different kinds of activities related to nature, sports, music, drama, graphic or plastic arts, or literature. Occasional use is made of videotaped or filmed sequences which focus on, illuminate, or present statements relevant to individual fulfillment. Work with groups of children in clinical experiences will develop in all WETEP teachers an awareness of the leisure potentialities in all of their pupils' activities.

Instructional Mode Benefits

Filmed and videotaped observations of children have the benefits of isolating and illuminating moments and events which would be impossible to capture any other way; therefore, these instructional techniques are used when applicable to aspects of the Leisure Education Element. Many of the instructional experiences in this element consist of direct or laboratory experiences. When possible, the subjects of learning are found in context so that it is possible to study them as parts of a whole rather than as isolated specimens.

Always available to WETEP students is the benefit of personal interaction, either in the form of seminars where concepts can be verbally clarified, and/or in the form of one-to-one conferences with faculty members and counselors where discussions may take place on any kind of question. It is in the conferences and seminars that many aspects of the affective domain can be explored, and these are modes of instruction particularly beneficial in an element such as Leisure Education.

Experiences of the student are perhaps the most important instructional mode in this element. Only if the teacher can himself discover the way to useful and enjoyable leisure activities can he guide children in the same direction. Because of the potential of interaction among elements in WETEP, many of these experiences can evolve from related, goal-directed activities.

ART EDUCATION

Ronald W. Neperud

Introduction and Abstract

Art shares with other areas of the curriculum several dimensions which provide a unifying factor in elementary education. For example, Art shares with Mathematics the perception of certain spatial relationships. Social Studies content can provide the subject matter for Art. While the Art specialist or Art teacher is primarily responsible for elementary visual arts education, the recognition of the shared dimension implies instructional responsibilities for all elementary teachers.

A major problem in teacher preparation courses in Art Education has been that of dealing effectively with the wide variability of prospective teachers' visual literacy. The WETEP model provides an opportunity to fit a program to each student's natural rate of progress. This program includes provisions for minimal competencies required of all teachers and the in-depth competencies of Art as a specialized study area.

In WETEP all classroom teachers will attain a degree of sophistication in the visual arts and be encouraged to seek further understanding and knowledge in Art. Since effectiveness in matters of the visual arts is partially determined by the sensitivity of visual powers, the teachers should be able to see in a discriminating manner. The WETEP teacher is offered aesthetic experiences as a viewer of Art and gains acquaintance with some of the media, processes and techniques employed in the visual arts.

The instructional modules comprising the Art Education Element are contained in four subelements. The first of the subelements is required of all students; the remaining three provide competencies to be attained by teachers who have chosen Art as an area of specialized study. The four subelements are:

1. Minimal Competencies Subelement. The competencies obtained in this subelement include an awareness of the historical, social and psychological foundations of Art, principles of design, processes in creating Art, criteria for viewing Art, children's developmental patterns in Art, and education theories and practices in teaching Art.
2. Understanding Art Subelements. This subelement involves the knowledge of historical movements in Art, understanding the aesthetic experience as a viewer of Art, the exercise of critical judgment, and the knowledge of the function of design in our culture.

3. Making Art Subelement. In the modules of this subelement teachers gain skills in various media and processes employed in the visual arts, competence in developing a personally expressive imagery in at least one medium, and the ability to evaluate their own and others' work in terms of aesthetic qualities and criteria.

4. Teaching Art Subelement. Here the WETEP teacher demonstrates understanding of children's development and learning patterns in the visual arts. Demonstrated ability to communicate enthusiastically and dramatically with students, employing both visual and verbal means, is required. Competence in selecting and organizing learning experiences and the physical environments for learning experiences, are major objectives of the subelement.

Program Benefits

1. The WETEP model places emphasis on the goal of individualism. Art, along with drama, dance, creative writing and music, provides opportunities for divergent and individualistic ways of thinking. WETEP teachers learn to interpret and evaluate student Art work, and to assist pupils in the exploration of their own ideas.

2. The creation of an attitude favorable to the arts is a step toward improving cross-cultural relationships. The WETEP teacher learns to help pupils achieve an awareness of all visual aspects of culture and of the function of design in the lives of people.

3. Ability to express oneself through some form of artistic endeavor may provide an individual with a satisfying, fulfilling experience. Encouragement of pupil sensitivity to Art and the teacher's response to children's views and feelings provide an atmosphere favorable to the growth of ability in Art.

4. Interrelatedness of disciplines is stressed in the modular design of the WETEP program. The Art Education Element clearly defines the role of all elementary teachers in the area of the visual arts.

5. The Art Education Element offers extensive opportunities for research. Such areas as variations in student perceptions in Art or instructional conditions in Art may be studied effectively through the WETEP program structure.

Types of Instructional Modules

Within the structure of the four Art subelements, four different types of modules are found, each reflecting different instructional strategies designed to meet particular objectives.

a. Substantive-Factual Modules. Where information is to be transmitted, such as on movements in Art, principles of design, or children's patterns of learning in Art, readings and programmed instruction are available. The viewing of videotaped and filmed instructional sequences, and the observation of children engaged in Art work, offer additional and/or alternative modes of presentation. Seminars and student-faculty conferences provide personal interaction with an opportunity for the clarification of ideas and approaches.

b. Critical Observation of Art Modules. Within these modules, the viewing of original Art is followed by sessions of critical analysis. Extensive use is made of field trips to Art galleries and museums, and of slides and films, as an adjunct to seminar discussion and student-faculty conferences.

c. Studio-Laboratory Modules. These modules are comprised of substantial blocks of independent study on problems in Art for all prospective teachers. Much of the work is done in Art labs with graduate assistants available to give help or answer questions. Seminars are provided for the review and discussion of special problems or for the viewing and discussion of selected films or slides.

d. Clinical Experiences Modules. To carry out the objectives for these modules, the Art specialist is presented with practical instructional problems of varying complexity and duration, interspersed with critical professional appraisals.

The actual teaching of children in Art begins with observations of children in classroom situations followed by microteaching episodes in which prospective teachers may work with small groups of pupils. The internship of the Art specialist provides him with the opportunity to function as a teacher in a school situation followed by frequent consultations with faculty advisors.

Instructional Mode Benefits

Since Art is essentially a sensory/emotional experience, a multisensory approach to learning as provided by WETEP in films, slides, tapes, manipulative materials and original Art must provide the best base for both interpreting and creating Art.

Interaction with other students and with faculty members through laboratory sessions, seminar discussions and personal conferences provides for the humanistic learning environments important to a full realization of individual potentialities.

Coordination of modules in the Educational Psychology Element, particularly in Human Development, makes the program in Art integrated and efficient for the student, providing him with the background needed to incorporate Art education into each aspect of the instructional program.

MUSIC EDUCATION

Virginia Chambers

Introduction and Abstract

Music as an art form can be understood through a variety of direct experiences ranging from listening to public performance. It is the objective of the WETEP Music Education Element to provide students with opportunities to gain knowledge, understanding and feeling for music through electing experiences which will fulfill their need for aesthetic expression.[1] The role of music in the cultures of the world will be shown, as will the relationship of functional to artistic music through direct experience in the making of music.

The Music Education Element acquaints students with the fundamentals of music, builds favorable attitudes towards music through having students listen and sing, and provides experiences for them to develop motor-skill competency in the use of music materials.

Experiences forming a basis for on-going development in music awareness and taste will be provided, as will those offering the student a background in the teaching of music.

Students vary considerably in their appreciation of music and in their ability to perform musically. It is anticipated that this variation will not be decreased as result of participation in the WETEP Music Element. Therefore, students will have a great variety of musical experiences among which they may choose as they develop competencies represented by the four Music Education subelements: Music Fundamentals, Functions and Historical Aspects of Music, Performance of Music and Music Instructional Methods.

Program Benefits

The Music Education Element offers prospective teachers the opportunity to become aware of music as a part of their cultural heritage and as one of the more satisfying means of self-expression.

Through the element, students may gain basic competency with musical techniques, and proficiency in transmitting enthusiasm and appreciation for music to pupils in elementary schools. A serious attempt will be made by each student to learn to make accurate evaluations of the individual abilities of the pupils.[2]

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[1] Editorial, The National Student Musician, January-February, 1968.

[2] Warner Benfield, "The Responsibility of the Professional Musician-Teacher," The Instrumentalist, June, 1969.

The Music Education Element offers students the benefits of a close functional tie with modules from the other elements, such as the Curriculum and Instruction, Educational Psychology and Leisure Education Elements. This direct relationship with experiences in other areas of WETEP provides a more integrated approach to their teacher preparation.

Types of Modules

The objectives of the Music Education Element are achieved through activities provided in the various instructional modules. Basic WETEP students will be expected to undertake study in the modules of the first two subelements. Students specializing in music will work in all four subelements. There is no required sequence except that the Teaching Music subelement assumes some experience in each of the others.

1. Music Fundamentals. All WETEP students will become familiar with the concepts of tone, pitch and melody, and the need for a notational system. They will become skilled in the techniques of listening and will be able to identify harmonic progressions in music. Audio-visual presentation modes--films, audio tapes and video tapes--will be used in conjunction with laboratory sessions for practical exercises. Opportunities for personal interaction will be provided by small group seminars for the discussion of problems and questions and by individual conferences between students and faculty members.

2. Functions and Historical Aspects of Music. The WETEP student becomes aware of how man has used music to form attitudes and to promote political and social change. He becomes able to identify such aspects of musical heritage as the structure of religious music and ways in which music is used as an element of the mass media.

   A principal mode of instruction in these modules is the use of audiotaped recordings containing many examples of the historical development and the functions of music. Readings and programmed instruction provide background information for orientation to music's social significance.[3]

3. Performance of Music. Students with a specialization in music will be expected to study piano for a number of semesters and finally demonstrate that they can play at

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[3] Leon Dallin, "Music Educators Should Get with the Program," Music Educator's Journal, March, 1969.

sight accompaniments such as are found in school textbooks. They should be able to harmonize a melodic line with appropriate chords and to transpose songs found in music textbooks to higher or lower keys. The principal activities in these modules are practice sessions in music labs augmented by demonstration films or tapes. Periodic assessment sessions will be held with graduate assistants or music faculty members.

4. Music Instructional Methods. All WETEP students will study modules on Human Development and on the Psychology of Learning found in the Educational Psychology Element, as well as modules on behaviors basic to successful teaching found in the Curriculum and Instruction Element. Music specialists will apply this knowledge to specific practice in the teaching of music. These students will be asked to demonstrate proficiency in instructional methods and in choosing instructional music materials for elementary pupils. The clinical experiences will offer the opportunity to work in schools, to help children understand and appreciate music fundamentals, form and function, and the satisfactions to be found in musical expression.

Instructional Mode Benefits

Music is a sensory form of communication employing many media to convey its message. Therefore, the teaching of music will rely heavily on the use of multi-sensory approaches. Extensive use of audio recordings will be made in learning about the fundamentals, form and history of music. In learning to perform vocally or on a musical instrument, demonstration films may be employed, permitting the student individual progress and unlimited repetition of instruction and at the same time freeing the instructor to perform in roles which require individual guidance.

Laboratory sessions for group practice or for the manipulation or playing of musical instruments or materials will be provided. Small group seminars and individual conferences provide students and faculty with opportunities for personal interaction.

PHYSICAL EDUCATION

Marie R. Mullan

Introduction and Abstract

Physical education in our schools must reflect the influence of significant advancements in our knowledge of learning and the educational process. The whole child goes to school, and while much of formal education is still directed toward the child's mind, the learner's body is involved in almost everything he does. Almost every aspect of the teaching-learning process has been modified as this viewpoint affects educational practice.[1] The physical education curriculum has been expanded in keeping with this proposition. The active experiences provided by the new physical education curriculum still serve to improve bodily functioning, as exercises in physical education have attempted for some time, but they are now directed to other goals as well. Experiences in the physical education class provide special opportunities for developing concepts about how space is organized, how time is related to space, how force is applied and observed[2] and how self-mastery is achieved through the development of movement potential. The concept of socially approved patterns of personal behavior is also developed in a unique way within the physical education curriculum as children explore the behavioral patterns implied by such concepts as "sportsmanship" and "respect for other persons."

The WETEP Physical Education Element stresses this integrated approach to physical education in the schools. Through an environment for learning which stresses personal development and interaction with other students and faculty, the element carries out a program centering on three areas: 1) self-concept, 2) sensory motor training, and

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[1] The entire WETEP instructional program and the other model teacher education programs are evidence of the extent to which participatory activities are viewed as a central portion of an ideal teacher education program.

[2] American Association for Health, Physical Education, and Recreation, This Is Physical Education, Washington, D. C., 1965, p. 5.

3) physical fitness. The importance of each of the three to a complete program is easily demonstrated.[3]

The Physical Education Element in WETEP places primary emphasis on the understanding of movement as it relates to self, as it can be observed in others, and as it can be improved through a systematic instructional program. This element includes three subelements which identify the broad characteristics of the WETEP teacher. Each subelement has two or more modules which serve to identify specifically the scope of the subelement. The subelements and modules are:

Subelement A: Understanding Human Movement
    Module 1: Operational Understanding of Movement
    Module 2: Understanding of Movement Through the Observation of Others

Subelement B: Guiding Movement Experiences of Children
    Module 1: Motor Development
    Module 2: Solving Movement Problems
    Module 3: Creativity in Movement

Subelement C: Intercommunicating the Function of Physical Education
    Module 1: Interpreting
    Module 2: Supporting
    Module 3: Interaction

The subelements and modules are not necessarily designed as sequential. However, it is anticipated that all WETEP students will develop an understanding of the first two subelements, and the third subelement will be of particular concern for those with special interest in physical education. Students are able to move into and out of each module in order to more truly provide individualized sequences. There will be considerable interaction with the modules in the Educational Psychology Element, the Curriculum and Instruction Element, the Health Element and the Communications Element. Also, basic science courses are required prior to admission to the Physical Education Element.

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[3] Four consultants (Combs, Kelley, Maslow, Rogers) agree that the sense of self is learned through experience; a positive self is teachable. Programs in physical education aid in developing appropriate motor responses to serve as a positive criterion for evaluation of self. ("Perceiving, Behaving, Becoming," ASCD Yearbook, 1962, p. 101.)

"The motor bases for perceptual development are posture, directionality and laterality, and awareness of position of the body in space." (Eric Denhoff in American Association for Health, Physical Education and Recreation, Perceptual-Motor Foundations: A Multidisciplinary Concern, 1969, p. 50.)

Piaget, Kephart, Gessell and others focus attention on early sensory-motor learning as a necessary building block for later complex perceptual and cognitive development.

Program Benefits

The philosophy behind the Physical Education Element suggests some of the program benefits that will be derived from the element. The element is based on the belief that "education at all levels should be value-oriented to increase the pupil's sensitivity and his receptivity to needed social programs to improve his skills in group relations, and to enhance his creative use of leisure."[4] This orientation for the element will provide the following program benefits:

1. The physical education curriculum in both schools and universities is undergoing a period of change and re-appraisal. The WETEP Physical Education Element is characterized by a flexible curriculum designed to foster self-mastery as well as physical training. Its content will help teachers plan for their students a sequence of experiences in which the students learn to move as they move to learn more about themselves and their world.

2. The WETEP Physical Education Element addresses social and emotional, as well as physical, needs of today's young people. The concept of socially approved patterns of personal behavior is relevant to all education experiences, but it is developed in a unique way within the physical education curriculum.[5] WETEP teachers will be prepared to stress behavioral implications of "honesty," "sportsmanship" and "respect" to their students through applications in the cooperative-competitive situations provided by games and sports. The WETEP teacher will be uniquely prepared to serve this function because of the emphasis given to this role in the physical education curriculum in WETEP. Thus, the WETEP Physical Education Element may offer a means for meeting some sociological and psychological needs.

3. The individualization of an instructional program yields particular benefits for the Physical Education Element.

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[4] Ann Jewett, "Physical Education for the Real World: Would-You-Believe Schools, unpublished mimeographed paper, University of Wisconsin, Madison, Wisconsin, 1969, p. 2.

[5] American Association for Health, Physical Education and Recreation, This Is Physical Education, Washington, D. C., 1965, p. 6.

Because WETEP students study the concept of self-mastery from an individualized approach, they will be better able to communicate this concept to their students. They will also develop a greater appreciation for communication with others through movement because they have explored this medium in the light of their own abilities and personality.

Types of Modules

The philosophy and specific objectives of the Physical Education Element are reflected in the four types of modules within the element. The activities planned for each module demonstrate both the verbal and nonverbal components of a physical education curriculum and the importance of self-understanding and education. Verbal symbols must be used to describe, analyze and talk about the ideas under consideration. But many of the central concepts of physical education must be expressed through activities in space and time.

Within each of the four types of modules the choice of instructional modes has been made to most effectively suit the purposes of the module, while at the same time permitting a maximum of student choice among modes.

The aim of the first group of modules is to assist the WETEP student in understanding movement. The student must be able to know what skillful movement is and be able to observe and evaluate movement intelligently. Thus, the modules make extensive use of individual laboratory activities which involve the student, and media such as video tapes and films permit the observation of both self and others.

The second group of modules is designed to provide an understanding of the child's development, both physical and psychological, and relate this understanding to the school setting. The modules involve considerable independent study and reading. All activities in these modules are closely coordinated with modules from Educational Psychology and Child Development.

The third group of modules have the objectives of planning and structuring experiences for children. Within these modules, students will develop skills of assessment, evaluation, and curriculum planning. Part of the work for these modules will be coordinated with other elements, particularly Curriculum and Instruction.

The fourth group of modules is designed for the WETEP student planning to specialize in physical education. These involve the synthesis of history and philosophy of education as they affect the physical education curriculum. The student will study the aesthetic meanings of movement and be encouraged to develop a creative view of how movement plays a part in culture. It is anticipated that the student will develop a sophisticated interpretation of the role of movement in self-mastery and in communication and cooperation with others.

Instructional Mode Benefits

The instructional modes used in the Physical Education Element are integrally related to the objectives and design of each module. While the element uses several of the instructional modes common to other elements, it also takes advantage of instructional techniques and equipment which are particularly well suited to the physical education curriculum.

Laboratory activities which provide opportunities for WETEP students to both experience and understand the relationship of movement to self-concept, sensory motor training and physical fitness, will utilize equipment especially designed to facilitate these objectives. Flexible equipment which can be used in many configurations and for many purposes will be employed to help the WETEP student experiment with creative materials and enable him to design and construct equipment to meet particular instructional objectives.[6] The use of versatile portable equipment and varied teaching-learning environments reflects an application of the principle that children's physical activity should provide opportunities for creativity just as do activities related to art or communications.

Observation of self, other students and children in movement will be carried out through the use of television cameras and monitors. It has been demonstrated that benefits can be obtained from these modes of instruction in terms of self-understanding and improved motor coordination.[7]

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[6] The use of portable equipment is described in Portable P. E. Equipment for Movement Education, K-6, R. W. Whittle, Ltd., P. V. Works, Manchester, England. The importance of environment for learning has been noted by Donald Brault, "Environment for Learning: Classroom, Gymnasium and Playground," and Carol Rasmus, "A Formula for Play: Child & Space & Imagination," in Association for Childhood Education International, Bulletin No. 23-A, 1968.

[7] See, for example, Chalmer G. Hixson, "The Status and Potential of Instructional Television for Physical Education," Journal of Health, Physical Education and Recreation, May-June, 1962, pp. 25, 16, 46; Richard T. Mackey, "Sports Skills Lessons on Television," Journal of Health, Physical Education and Recreation, May, 1968, pp. 31,32,85; and Marjorie A. Souder, et. al., A Study of the Effectiveness of Televised Instruction in a Physical Education Activity Course, Stipes Publishing Company, Champaign, Illinois, 1962.

The Physical Education Element also makes extensive use of programmed instruction and computer-assisted instruction as modes for transmitting information.[8] These modes are offered in conjunction with seminars and conferences designed to relate the content within the element to the specific needs of each WETEP student. Whereas the content can be readily transmitted by the programmed instruction and/or CAI, the relationships to school programs and instruction are elicited in the seminars and conferences.

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[8] Some earlier uses of programmed instruction have been described in Jim Dupont, "Programmed Learning in the Athletic Program," The Athletic Journal, April, 1966, pp. 62-91; and in John Redd, "Programmed Learning in Health and Physical Education," The Physical Educator, December, 1963, pp. 174-175.

SCREENING

Dan W. Andersen

Introduction and Abstract

The Input Component of an ideal teacher education program should perform the functions of orienting, advising and screening incoming students. Introductory experiences should enable students to examine Elementary Education as a professional field. In addition to developing an awareness of the demands and rewards of teaching children, the students should determine to some extent their suitability for that role. The Input Component of WETEP is designed to perform this critical function through two elements, Screening and Orientation. While they are described individually, they are functionally integrated in practice.

A major function of the Screening Element of WETEP is the establishment of an acquaintanceship between the student and the WETEP program, the university, and the teaching profession. The two-way communication between the student and the other entities should result in a familiarity which is mutually beneficial. The student is able to determine his affinity for the WETEP approach to preparing elementary teachers for the School of Education of the University of Wisconsin facilities and staff and for the profession of elementary teacher. Meanwhile, WETEP personnel are becoming informed as to the personality, achievement, and potentiality of the student. Among the results of this interaction are: (1) the determination as to whether the student enrolls and is accepted into the Orientation Element, and (2) upon completion of that element a decision mutually arrived at by the student and the WETEP staff as to whether the student shall be encouraged to continue within WETEP.

In order to provide the appropriate information that will determine whether a student could and should enroll in the Orientation Element and subsequent continuation within WETEP, the following activities and functions of the Screening Element have been designed:

1. A Colloquium designed to provide all interested students with a succinct overview of the major features of the elementary teacher profession and WETEP in particular. This colloquium will have the following features:
   a. Film presentation of "A Day in the Life of a Teacher"
   b. Film or slide presentation of the various components expressed in WETEP
   c. A panel discussion with WETEP staff and selected students reacting to the WETEP film or slide presentation

d. Small group discussion (8-10 students per group) raising questions and eliciting responses from WETEP staff as to appropriateness of students' candidacy for WETEP

2. A Computer System designed to provide WETEP program information through student-terminal interaction. The student will have full access to program offering possibilities by addressing his questions to the teletype terminal.

3. A Record Check of students' prior academic performance as well as appropriate biographical data that will help provide data for initial admission decision.

4. New Data Collection will be dependent upon and a consequence of the Record Check. If the student indicates interest in WETEP candidacy, he will be given a battery of instruments in an attempt to measure proficiency and profile in the following dimensions:

   Achievement
   Aptitude
   Attitude
   Personal Traits
   Communication Skills
   Interests
   Professional Commitment

5. An Interview will culminate the screening activities. Each student will meet individually with a WETEP staff member in reviewing the student's data profile for admission request into WETEP. The interview will provide the WETEP interviewer the opportunity of checking out any profile deficiencies or reservations of the student before a final decision is made.

Program Benefits

It appears evident that through the activities described above there should accrue to the program considerable benefits that are not apparent in our present day operation. The following benefits should be expected:

1. Of primary importance is the potential for a better selective process for teacher candidates. Systematic data collection will provide measures on a large number of variables that are now alluded to but seldom included in the screening process.

2. Improved selection process data will provide a much better profile on candidate characteristics. This will provide the means for more intelligent decisions on the part of both the institution and the candidate.

3. Candidate data information will permit both cross-sectional as well as longitudinal research inquiry that will help answer questions that have long plagued the profession regarding the relationship between teacher characteristics and teacher effectiveness.[1]

4. The teacher candidate in light of available data will be able to make a much more intelligent and improved decision as to his own potential and disabilities for teaching.

5. With screening allocation being controlled more systematically, it will be possible to "screen in" students with particular characteristics. For instance, it may be desirable to admit particular students with either social or academic disadvantages. The progress of these students may be monitored to obtain evidence of how their disadvantage affects their progress through the program and eventual success in the classroom.[2]

6. This screening system could well serve as an exemplar both to the other schools of education as well as other professional schools in providing them a referent for changes they would choose to make in their own programs.

Instructional Mode Benefits

A variety of instructional modes will be utilized in the Screening Element of WETEP. The manner in which these modes will be used to introduce students to WETEP will provide a preview to the students of what they may expect from fuller participation in WETEP. Some use of large group instruction will provide the student with both an understanding of the breadth and depth of the WETEP staff as they present the various components of the program and with opportunities to hear viewpoints of other students as they contemplate a career in education.

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[1] J. W. Getzels and P. W. Jackson, "The Teacher's Personality and Characteristics," in Nathan Gage, editor, Handbook of Research on Teaching, Rand McNally and Co., Chicago, 1963, p. 506-507.

H. S. Broudy, "Continuing Search for Criteria," American Association of Colleges for Teacher Education Yearbook, Vol. 20, 1967, pp. 30-39.

J. W. Giebink, "Failure of the Minnesota Teacher Attitude Inventory to Relate to Teacher Behavior," Journal of Teacher Education, Vol. 18, Summer, 1967, pp. 233-239.

[2] D. L. Dowman and L. F. Campbell, "Quantitative and Qualitative Effects of Revised Selection and Training Procedures in the Education of Teachers of the Culturally Disadvantaged," Interim Report, Office of Education, Bureau of Research, June, 1969.

One of the most radical departures from the present program will be an organized computer assisted data bank that will permit students ready access to answers to the variety of questions they might have pertinent to this program.[3] This computer program, once prepared by WETEP staff, will permit the student either individually or in small groups to seek responses to the program and career concerns he has in elementary education. The availability of the computer data bank will make unnecessary the need for the type of individual counseling that is essentially information giving and can be done more effectively through computer programs. Time spent in faculty-student conferences, therefore, can be devoted to topics relevant to the student's personal goals.

Small group seminars after students have participated in large group instruction will permit students to meet with WETEP staff and engage in meaningful discussion pertinent to their desires, aptitudes, and abilities for teaching, as well as learning of the institutional and professional requirements deemed necessary for teaching. These small group seminars will serve as a critical decision point as to the desirability of the individual and the institution engaging in a partnership in which the student participates in WETEP.

Maximum use of locally developed films, video tapes, film strips, and slides will bring the various aspects of both the teacher education program and life in the classroom directly to the student. These materials will depict for the student the activities that he will be required to engage in as a classroom teacher. These materials will be maximally effective because they will represent situations developed and matured in the local setting.

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[3] C. D. Sullivan, et. al., "The WETEP Media and Telecommunication System," WETEP, Vol 1: Position Papers.

ORIENTATION

Theodore J. Czajkowski

Introduction and Abstract

The experiences in the WETEP Orientation Element are designed to enable students to examine Elementary Education as a professional field. They provide the first serious glimpse of what teaching is and what it is not. These experiences acclimate prospective teachers to some of the innovations now a part of the educational scene, e.g., team teaching, multi-media instruction, individualized instruction, nongraded instruction, and computer-assisted instruction through the use of similar instructional modes in the teacher education program. Exposed to many teaching methods and strategies, students will not be expected to develop personal expertise in the area of teaching skills within this element. They will, however, be provided with as great a variety of experiences as possible, depicting for them the scope, responsibilities and processes inherent in the elementary teacher role.

The Initial Screening in the Screening Element will have resulted in the compilation of information about student abilities, interests, personality traits, value orientation, attitudes, past experiences with children, and other biographical data. The Orientation Element will extend screening activities by providing an opportunity for extended personal interviews aimed at developing individualized programs for teacher preparation. These activities will assist students in constructing an appropriate personal instructional plan within WETEP and will provide opportunities for them to make personal assessments of their interests and abilities as prospective teachers.

The instructional modules of the Orientation Element are found within the framework of three subelements: 1) Teacher Role Orientation, 2) Personal Orientation, and 3) WETEP Orientation.

Program Benefits

Because program benefits are closely related to the three subelements, they will be discussed under those headings.

1. Teacher Role Orientation. The student is presented with a number of vicarious and live teaching demonstrations in this subelement, some considered "good" and others "bad." The purpose in offering demonstrations which have a range of quality is to enable the student to actively participate in observing and analyzing the effects of various instructional techniques on pupils. Recent research on modeling behavior suggests that more controlled early observation experiences

may eliminate problems of students modeling inappropriate teaching behaviors.[1] Some opportunity is given students to employ the benefits of this observation and analytical knowledge in microteaching situations.[2] This strategy should result in a student with improved classroom observation skills and an increased knowledge of what it is to be a teacher.[3]

2. Personal Orientation. The events of this subelement offer the potential teacher an opportunity to examine himself in relation to his growing knowledge of the role of the teacher. Faculty members and students examine together the student's biographical data, his value system and aptitudes, and derive from this examination insights and interpretations into the student's potentialities for a career in teaching. Much of the self-knowledge gained in this subelement will have valuable application for WETEP students later when their potentialities and capabilities are re-examined in the modules of the Leisure Education and Guidance Elements.

3. WETEP Orientation. Among the very early events available in this subelement is a small group advising session, designed to answer many of the routine questions now being handled by individual staff members. The group session should enable the educational staff to serve students more efficiently. Many student questions will also be answered through computer assistance, which will inform students as to the most rational program for them to take and alternative programs which are available.

   Faculty-student conferences will provide opportunities to pursue in depth student interests and concerns related to becoming elementary teachers. The faculty directs the student toward a sequence which appears to be appropriate to the needs, interests and value system of the individual.

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[1] Donald N. Lange, "The Effect of Videotape Modeling Techniques in Eliciting Imitative Responses in a Group of Student Teachers Using Flanders' Interaction Analysis as a Criterion," unpublished Ph. D. Dissertation, University of New Mexico, 1968.

[2] For a more complete discussion of this subject, see Dwight Allen and Kevin Ryan, Microteaching, Addison-Wesley Publishing Company, Inc., Reading, 1969.

[3] N. L. Gage, "Paradigms for Research on Teaching," in Handbook of Research on Teaching, American Educational Research Association, Rand McNally and Company, Chicago, 1963.

Types of Modules

The content and the experiences available within each module are numerous, diffuse and varied, and students find several alternative forms to choose from in attaining the objectives of the module.

Within the Teacher Role Orientation Subelement, modules cover two types of situations: 1) those in which the student acts as an observer, analyzing the effectiveness of decision-making by others, and 2) those actual interactions with children. In the first case, the student spends some time in the observation of teachers in action. He will also have filmed teaching sequences available to him followed by seminars which offer opportunity for group analysis of various teaching techniques. In the second case, a number of independent study and lab-clinical experiences are offered. Students will have the opportunity of participating in simulations giving them practice in the decision-making process. Use is made of programmed instruction and computer-assisted instruction to supplement the decision-making experience. Microteaching sessions are offered, giving the prospective teacher the chance to view and analyze himself in action with a small group of children. This event is followed by an immediate feedback conference with a faculty member or supervisor, aimed at assessing the pupil's performance in this module. The videotape replay provides the opportunity to more objectively analyze the teaching behavior(s) attempted in microteaching.

In the modules of the Personal Orientation Subelement, a student's biographical data, value system and aptitudes are examined by himself and the WETEP staff to increase the staff's understanding of the student and offer the student experience in self-analysis through inquiry. Selected modules from the Educational Psychology Element are related to this subelement. Some of the modules are informational in nature, employing reading, audio tapes, programmed and computer-assisted modes of instruction. Information analysis takes place in seminars and student-faculty conferences. Lab-clinical experiences offer the students role-playing situations where their reactions and behaviors may be observed and analyzed prior to their entrance into actual work with children.

The WETEP Orientation Subelement offers in a video presentation an overview of the whole Teaching-Learning component. An introductory module from the Educational Psychology Element is included here, as well as some material from Educational Policy Studies. Some of the independent study making up this subelement consists of orientation visits to various available instructional resources, such as the Bureau of Audiovisual Instruction, the Instructional Materials Center and the Multimedia Laboratory.

Mode Benefits

Efficient and imaginative use will be made of media in the Orientation Element. The content of the instructional modules consists essentially of two types:

a. Overview information. A great deal of introductory information is presented by means of tape and film, as well as through programmed instruction. Large numbers of student questions are answered through computer assistance, advising students as to the most rational directions for them to take and alternative procedures which are available. This procedure is efficient and direct and does not monopolize considerable professional staff time for routine question answering. Small group and individual student-faculty conferences meet the need for direct personal contact and the individual psychological orientation which is necessary in a humanistic approach to education.

b. Observation of Teaching Technique. Some opportunity is given students to employ the benefits of observation of teachers, pupils and of themselves. Much of this is done by means of video tape or film, including the viewing of microteaching episodes on tape. These strategies provide a student with a representative number of analytical experiences in abbreviated teaching situations and with improved classroom observation skills resulting in more accurate understanding of what is required of a teacher.

GUIDANCE EDUCATION

Philip A. Perrone

Introduction and Abstract

One of the more important objectives of WETEP is that the prospective teacher should come to know himself and to understand his motivations. This emphasis is demonstrated by references to several elements in addition to Guidance. Objectives in the Orientation Element stress the teacher's identification of his own attitudes and attributes.[1] Modules in the Educational Psychology Element center on students' understanding themselves in the context of human learning and development.[2] The Leisure Education Element is based upon the individual's recognizing the means of his self-fulfillment, through leisure activities.[3]

In the Guidance Education Element, a major portion of the student's experience is devoted to reapplying what he knows about himself to his work with others. The other important aspect of work in this element is that students learn to help their pupils with educational, personal, and vocational decisions. In effect, this program is more affective than cognitive, more applied than didactic. The basic tools of the Guidance Element are interviewing and counseling practicums, communication processes, the utilization of school and community resources, and understanding the role and function of helping people. The primary goal is to help the teacher gain articulation between cognitive, theoretical learning and actual practice in counseling.

Every WETEP teacher will engage in activities such as individual counseling, interviewing, preparing case studies and sensitivity training designed to help him understand his own behavior and how it is perceived by and affects others. Those teachers with a counseling specialization will be made aware of conditions affecting the total development, academic and social, of the child. The teacher will learn to identify strengths and weaknesses in the child's emotional, physical, intellectual and social characteristics and use this knowledge to help him form the foundation for a fulfilling life.

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[1] "Orientation," WETEP, Vol. II: Element Specifications, School of Education, University of Wisconsin, Madison, Wisconsin, 1968, p. 15.

[2] "Educational Psychology," WETEP, Vol. II: Element Specifications, p. 35.

[3] "Leisure Education," WETEP, Vol. III: Element Specifications, p. 81.

Program Benefits

1. Learning About Self. Practical techniques for a prospective teacher to accurately predict his own future success in teaching are valuable for any teacher education institution. In WETEP's Guidance Element, information about the student is collected from individual appraisals and from feedback from participation in counseling experiences. Laboratory experiences, supervised counseling, and self-analyses of skills and interpersonal relationships will be used to provide the WETEP teacher with opportunities for self-evaluation and further development of self-understanding.

   Each teacher will learn to assess more adequately:

   a. His motives and strategies used in dealing with people,
   b. Reactions in others when he reacts with them,
   c. His own cognitive sets (value systems, stereotypes, etc.) and how they affect impression formation, and
   d. The ways in which his behavior can affect the psychological and social development of others.

2. Developing Counseling and Communication Skills. Basic to working with and helping individuals to change behavior is the achievement of an effective interpersonal relationship. The Guidance Element of WETEP involves the trainee in numerous observations of experienced teachers and counselors working with elementary school children from many populations with varied learning and social problems. As all WETEP students progress, they are given a practicum in interviewing. This technique includes learning how to communicate effectively with parents and colleagues as well as with students.

3. Understanding the Role and Functions of Helping Persons. The WETEP Guidance program stresses the student's knowledge of his community and his ability and skill in referring pupils to varied community resources. The WETEP student learns about the phases of vocational development, and the steps children take in finding out about and preparing to choose a profession. As he learns to identify choice points in the long decision making process, he is better able to assist pupils to recognize those points.

Types of Modules

The instructional modules in the Guidance Element consist of two basic types. There are those with the primary objective to transmit information. Extensive use is made of films and video tapes to show prospective teachers strategies in dealing with people, reactions of others to him, and impression formation on children. Seminars and group discussions facilitate personal interaction among students and faculty members and help clarify ideas through verbal exchange.

Extensive use is made in this element of laboratory and clinical experiences to provide the WETEP student with actual practice in the counseling field. Observations of experienced counselors working with children, practice in interviewing techniques, role-playing as interviewer and interviewee, and finally actual counseling with children in schools all bring the WETEP student closer to professionalism in the field of Guidance.

Instructional Mode Benefits

The use of electronic media to transmit information has the benefit of providing varied stimuli to perception. In Guidance, which focuses on human responses and reactions, the media are well able to display stimulus situations which are heard or viewed. Seminars and group discussions insure opportunities for personal interaction in the examination of related questions.

A use of videotaping especially applicable to the Guidance Element is that of providing the prospective teacher an opportunity to view himself working with children. This technique offers him some insight into his strengths and weaknesses as a counselor, and permits him, through repeated tapings, to study progress he might make.

Reliance on numerous laboratory and clinical experiences in this element provides students with many and varied opportunities for practice in Guidance before the beginning of their professional work in that field. The advantages of this guided practice, accompanied by professional and self-assessment, are considerable when compared with present reading and field work experiences.

MEDIA AND TECHNOLOGY

Charles D. Sullivan

Introduction and Abstract

Media in the Wisconsin Elementary Teacher Education Project perform defined and specific tasks. First, they are a mechanism by which content is presented to students. Media and technology facilitate innovative presentation techniques and may be used to present much material that previously might have been presented solely by lecture or demonstration. Second, the Media and Technology Element as one of the nineteen WETEP instructional elements serves as an instructional unit to provide technological strategies and capabilities to pre-service teachers as they prepare for the utilization of media and technology in their future teaching.

Therefore, the Media and Technology Element performs two functions: (1) it is a part of the instructional program, and (2) it serves as a resource center for the selection and preparation of instructional media used in the other elements of the WETEP program.

The instructional role of the Media and Technology Element is carried out through three subelements: 1) Instructional Media and Mediated Instruction, 2) Instructional Techniques, and 3) Research in Media and Technology. Within these subelements are eight representative modules, based upon objectives directed towards the selection, evaluation, design, construction, and utilization of instructional materials, the utilization and management of a Learning Resources Center, the production and uses of programmed instruction, computer-assisted instruction, and simulation, and the design and interpretation of research in media.

The resource center function of the Media and Technology Element is integrally related to the design of a humanistic environment for learning which is central to WETEP. WETEP's formula for achieving the objectives stated in its various elements depends on the total involvement of the learner under close instructional supervision and guidance. A major communication emphasis is on person-to-person contact between students and faculty through individual and small group conferences. The humanistic environment is made possible by the extensive utilization of technological facilities designed to increase the effectiveness of information transmission to students.[1] A critical aspect in the development of such a system is the proper selection of instructional media to fit different learning objectives while meeting the individual needs of students.

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[1] Charles D. Sullivan, et. al., "The WETEP Media and Telecommunication System," WETEP, Vol. I: Position Papers, School of Education, University of Wisconsin, Madison, Wisconsin, 1969.

Media selections will be made only after specification of the types of learning involved, the desired behavioral objectives to be attained, and the particular instructional event to occur.[2] Media options will be examined in light of previous findings and field-tested to verify effectiveness, economy, and convenience. Written specifications for the selection, preparation, production, and utilization of materials are all part of the development and implementation procedure. In the WETEP Program Development and Research Center, continuous study of media choice related to individual learning experiences will be maintained.

All audio-visual material will be stored in an information retrieval system on audio tape, video tape, sound films, slides, or in computer memory banks. The WETEP faculty and staff will be directly responsible for programming, development, and research associated with these stored materials.

Program Benefits

Having recognized media and technology as an important, operational and integral part of the WETEP program, there are many substantive benefits to be derived from this particular element.

1. The fact that this program has the capability of presenting a spectrum of media choices to students and faculty is a general and far-reaching benefit. Initially, the function of the Media and Technology Element will be to provide the WETEP faculty with a familiarization with media modes plus the functional capability of utilizing media in their subject matter presentation.[3] Following WETEP implementation, the element will provide the same familiarization with the broad range of media and technology options to the pre-service or in-service elementary teacher.

2. The Media and Technology Element will act as a focus for the review, selection and implementation of instructional strategies. This provides pre-service candidates the

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[6] John M. Kean and Margaret A. Sterner, "Benefits of Systematically Relating Objectives and Instructional Media Through Appropriate Applications of Learning Principles," WETEP Feasibility Study, Vol. V: Program and Support Systems.

[3] John M. Kean, "New Roles For University Faculty," WETEP, Vol. I: Position Papers.

opportunity to explore varieties of educational learning experiences for themselves and also to gain an understanding of how these strategies might operate in their own teaching situations. As research relating types of learning to modes of instruction is still rather limited, the opportunity to investigate these relationships within the Media and Technology Element constitutes a substantial benefit to the educational community at large and ultimately to the schools it serves.

3. The specific relationship between presentation techniques and content operating at the receptivity level of a given student can be further explored from an operational rather than a theoretical standpoint within this element. Media and technology will provide remote observation of real life situations which might be interrupted were individuals actually present in that situation. Pre-service candidates will have an opportunity for broad exposure to a variety of learning approaches for themselves and for elementary students so that they will be better prepared to meet circumstances and situations that will arise in the classroom or teaching situation.[4]

4. An additional program benefit of the Media and Technology Element is the student assessment function in many of the modes of instruction employed. Immediate recording of student performance in the programmed instruction and computer-assisted instruction modes, assessment by the laboratory assistant of student demonstrations of competency in equipment utilization, professorial assessment of student understandings through the Demonstration-Lecture mode and through seminars preclude the necessity for standardized or written pencil-and-paper tests.

The benefits of intrinsic assessment may thus be stated in terms of 1) less time lost in the testing process, and 2) increased relevance of the assessment procedure to the task being evaluated.

Types of Modules

Each module of the Media and Technology Element is unique in its form, objectives, and modes of presentation. Therefore, it is not possible to use exemplary modules to illustrate groups of like modules. Taking the element as a whole, it is possible to summarize the criteria by which instructional modes were chosen.

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[4] Alan C. Green, editor, Educational Facilities with New Media, Rensselaer Polytechnic Institute and Department of Audiovisual Instruction, National Education Association, Washington, 1966.

Where possible, content of the element is available through use of the new media. The benefit of this is two-fold: it serves to transmit information quickly and efficiently, and it serves the student as a practical demonstration of the subject being discussed. In the case of content transmitted through programmed instruction or computer-assisted instruction there is the additional benefit of a built-in assessment affording immediate recording of student knowledge and understanding.[5]

Where practice in the use of media or technology is required, a considerable amount of the student's time is spent in the Media and Technology laboratory where facility with many kinds of equipment can be gained.

Among many subjects to be discussed, the critical matter of media selection relative to types of learning taking place will be analyzed in seminars held regularly within this element. Because of the intensive research into this subject which is expected in the years ahead, this feature of the element insures that the element will have continued relevance in the 1970's.

Instructional Mode Benefits

1. The modules of the Media and Technology Element provide the individual, whether faculty or pre-service candidate, with the opportunity to gain competence in handling many information transmission techniques. Throughout the element, emphasis is placed on independent practice or study. In the Media Laboratory, individual instructional sequences are provided on the uses of technology. Here, through the actual manipulation of equipment and materials, students gain facility in the preparation and presentation of mediated instruction.

2. A mode of instruction unique to this element is the student Demonstration-Lecture mode. Here the teacher candidate is called upon to show his competence through actual demonstration to a general audience, to parents, to other teachers, of specific media (three-dimensional materials or CAI, for example). This Demonstration-Lecture will be observed and assessed by a faculty member. Its benefit is to integrate as nearly as possible the process being studied into quasi-instructional situations.

3. A significant segment of learning time is spent in interacting with the computer-managed dial-access system. This technique allows for the possibility of greater individualization of choice, timing or pacing than traditional instructional methods, greater speed of acquisition and a differentiation of stimuli.

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[5] Patrick Suppes, "Computer Technology and The Future of Education," Phi Delta Kappan, April, 1968, p. 420.

4. The process of microteaching, an integral mode of instruction in all of the subject area elements, will be specifically studied in the Media and Technology Element. This mode has the benefit of presenting students with an opportunity to expand normal knowledge of results, or feedback, from a teaching experience. Through immediate replay of videotaped teaching segments, the student may analyze and criticize his performance and be thus encouraged to achieve a higher degree of personal control in his own teacher preparation.[6]

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[6] Dwight Allen and Kevin Ryan, Microteaching, Addison-Wesley Publishing Co., Inc., Reading, 1969.

EDUCATIONAL PSYCHOLOGY

Thomas A. Ringness

Introduction and Abstract

A consideration of objectives, assessment of entering behavior, choice of instructional techniques, assessment of learning, diagnosis of difficulties, and other aspects of instruction are all dependent upon the psychology of learning and instruction, regardless of the teaching field in question.[1] It is therefore mandatory that a teacher have a thorough knowledge of educational psychology and its relevance to the teaching situation.[2]

The WETEP Educational Psychology Element is designed to enable the prospective teacher to both understand principles of learning theory and psychology and to be able to utilize his understanding in planning and carrying out instructional activities. The element is structured as three subelements: Human Development, Human Learning, and Measurement and Evaluation. These provide basic resources upon which the other elements of the training program may call. They are closely integrated with other aspects of WETEP, servicing such elements as Communications, Science, Health, Social Studies, and Special Education.

Within each subelement, subject matter is further subdivided into modules, each of which contains the following sequence of instructional activities: prospectus, pre-test, instructional unit and post-test. The order or sequence in which students may study the content of different modules is determined on the basis of four interlocking considerations: 1) special prerequisites for certain modules, 2) objectives of other WETEP elements, 3) professional advice or counselor recommendation, and 4) student's personal choice where elective options are available.

The modules are organized on a continuum distinguished by three levels, ranging from the general to the specialized. The general level includes survey material, generalizations, and data which introduce students to basic introductory content. The second level modules offer more specific knowledge and introduce sophisticated analyses. The third level modules are highly specialized and are designed to meet particular needs of individual students.

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[1] E. R. Hilgard, "Theories of Teaching," in Theories of Learning and Instruction, 63rd Yearbook, National Society for the Study of Education, University of Chicago Press, Chicago, 1964.

[2] Arthur Combs, The Professional Education of Teachers: A Perceptual View of Teacher Preparation, Allyn and Bacon, Boston, 1965.

Program Benefits

The structure of the Educational Psychology Element constitutes a substantial program benefit. Mastery of a basic core of material is required for all students. However, the time required of all WETEP students is approximately one-half the time currently spent in educational psychology courses. Beyond this requirement, the element is organized as a service element for other WETEP elements. This means that other elements may require students to participate in various parts of the program in the Educational Psychology Element as particular topics are relevant to their progress. For example, prior to dealing with the topic of concept formation in mathematics, a student may be required to participate in modules on learning in young children offered by Educational Psychology. The benefit of this organizational structure to both the WETEP student and his future pupils can hardly be overstated. Aside from increasing efficiency of learning and avoiding duplication of effort among elements, principles of educational psychology will have direct and immediate influence upon the design of instructional sequences because they will be studied in conjunction with modules dealing with instruction in specific subjects.

Each subelement offers particular program benefits by clearly presenting both the rationale for and the content of a subject area directly related to teaching. The Human Development Subelement is based on the premise that a teacher must know about children before he can teach them. Topics covered in this subelement insure that a prospective teacher will be able to motivate his students,[3] present material at a proper level for student comprehension[4] and stimulate creativity and problem solving.[5]

Modules in the Human Learning Subelement clarify instructional objectives in the light of learning theory, underline the relationship of organization of course content to learning principles and suggest instructional techniques suitable for given purposes.[6]

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[3] E. J. Murrey, Motivation and Emotions, Vol. I., Prentice Hall, Englewood Cliffs, N.J., 1964.

[4] J. P. DeCecco, The Psychology of Learning & Instruction, Prentice Hall, Englewood Cliffs, N.J., 1968, Chapter 3.

[5] Gary Davis, The Current Status of Research and Theory in Human Problem Solving, Occasional Paper No. 2, Research and Development Center for Learning and Re-Education, Madison, Wisconsin, 1966.

[6] John M. Kean and Margaret A. Sterner, "Benefits of Systematically Relating Objectives and Instructional Media Through Appropriate Applications of Learning Principles," WETEP Feasibility Study, Vol. V: Program and Support Systems.

The Measurement and Evaluation Subelement will prepare the prospective teacher to diagnose student difficulties and to insure that he is teaching what he intends to teach. It will thus address aspects of the teaching situation which have not been stressed in most teacher education programs.

Types of Modules

Instructional strategies used in the Educational Psychology Element will vary according to the objectives and content of the subelements and modules. For the most part, information will be imparted via video tapes and readings; most of the relevant research and applications in Educational Psychology does not lend itself well to presentation by means of programmed instruction. In order to develop implications and applications of psychological principles, conferences and seminars will be used in all subelements.

The subelement of Measurement and Evaluation will require student laboratory activity in construction and analyzing various kinds of tests. This subelement also lends itself to Computer-Assisted Instruction.

Modules in the subelement of Human Development require clinical activities in which WETEP students observe, interview, and possibly test boys and girls.

Certain subelements dealing with teacher-pupil interaction and with affective learning will employ sensitivity training for student teachers.

Instructional Mode Benefits

The use of video tapes and readings as efficient means of presentation of material has already been documented.[7] Within the Educational Psychology Element, video tapes will provide demonstrations of the role of psychological principles in student learning and the possibilities for effective use of these principles in teaching situations.

Small group seminars are an important instructional mode in this element. They represent a substantial departure from traditional instruction in educational psychology for prospective teachers which typically features large classes. The effectiveness of seminars for permitting an active interchange of ideas among students has been described by students participating in classes structured in this manner.[8]

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[7] Leslie Briggs, et. al., Instructional Media, American Institute for Research, Pittsburgh, 1967.

Throughout the element, a variety of instructional modes will enable students to engage in learning activities suited to their own needs and personalities. Thus, a secondary benefit of the element is that through their own experiences WETEP students will become acquainted with individualized instruction and the manner in which it directly incorporates principles of educational psychology.

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[8] "Relevant Learning," The Teaching of Psychology Newsletter, March, 1969, pp. 1-9.

EDUCATIONAL POLICY STUDIES

B. Robert Tabachnick

Introduction and Abstract

In WETEP, an opportunity for understanding education in its professional context is provided for every teacher candidate. A wide range of inquiry bearing on educational policy is encouraged as part of a program included in the Department of Educational Policy Studies, coordinated by the Professional Sequence Committee of the School of Education, which also coordinates WETEP. The study of social and philosophical foundations is designed to meet the needs and interests of students and faculty with appropriate uniqueness. Through flexible administration and evaluation of their participation, student involvement is individualized and related to the personal interests of each.

Educational Policy Studies offer prospective teachers an opportunity to examine in depth questions which have general applicability to the subject of education. The objectives of these studies are achieved through activities provided in four to six instructional modules, consisting of five to six weeks of concentration on given educational problems. Basic WETEP students, those for whom extensive work in this foundational area is not relevant or desired, or those students who have been assessed as sufficiently competent in it, can elect to spend a minimal amount of time in these studies, completing only one required module.

However, for those students to whom social and philosophical problems are particularly important, such as those preparing to teach in special schools or in disadvantaged areas, it will be possible to select up to six modules in the Educational Policy Studies Department. Students selecting the maximum number of available modules would, in most cases, tailor their programs to include fewer modules from within the Educational Psychology Element.

Program Benefits

By choosing without restriction those modules of particular interest or applicability to them, students may successfully pattern their Educational Policy Studies to their individual academic backgrounds, prospective teaching fields, or professional goals. Educational Policy Studies offers students the benefits of a close functional tie with modules from various WETEP elements, such as Educational Psychology, the Culturally Diverse, Social Studies Education, and Science Education. However, its independence from the WETEP program itself will enhance the diversity of viewpoints from which Elementary Teacher Education may be viewed.

Types of Modules

Selecting from among those units which he finds particularly pertinent, the student can build his own program of social and philosophical foundations in the professional sequence. Students particularly interested in issues in contemporary education, for example, might study problems such as segregation faced by many schools, and examine the related legal actions taken on these issues. They might study the history of religion in public education and analyze court decisions which gradually brought about complete separation between the church and the public school. A student interested in unionization might select a module entitled "Collective Bargaining in Education". And students intrigued with the power structure of educational institutions might choose the module "Government, Organization, and Control of Schools".

Instructional Mode Benefits

Modes of instruction within the study of educational policy are chosen for their appropriateness in transmitting philosophical and social concepts and their subsequent analysis and discussion by students. Independent study is encouraged through various modes: through critical readings, or analyses of audio tapes, films, video tapes, or other multi-sensory approaches to learning.

Interaction with other students and with faculty members through seminar discussion and personal conferences provides for the humanistic learning environment important to a full realization of individual potentialities.

Microteaching experiences, planned in coordination with the Curriculum and Instruction Element, will permit WETEP students to relate activities within Educational Policy Studies directly to teaching, as will many field experiences offered. Work with community agencies, observation of significant school structurings, or conferences with school and governmental administrations are among the many opportunities provided to lend practical dimensions to study of the social and philosophical foundations of education.

CURRICULUM AND INSTRUCTION

Kenneth R. Howey and Donald N. Lange

Introduction and Abstract

There are two major aspects of the WETEP Curriculum and Instruction Element. First, it provides a framework in which the various functions and responsibilities of a teacher may be studied for purposes of a comprehensive, scientific and analytic study of curriculum, instruction, teaching and learning, and the interrelationship of these processes with one another. Second, it provides students with teaching experiences involving professional responsibilities during an extended period of internship.

The Curriculum and Instruction Element is in constant interaction with all other elements of WETEP. It includes four subelements which identify the broad characteristics that the WETEP teacher will acquire as a result of his participation in the program. Each subelement has from three to six modules which identify specifically the scope and sequence of possible teacher behavior within the subelement. The primary objectives within the subelement structure are:

a) student ability to select appropriate data sources and diagnose data relevant to the development of objectives for learners (Diagnosis)

b) student ability to formulate appropriate objectives, teaching-learning activities and evaluative procedures (Planning)

c) student ability to translate curriculum plans into operational teaching-learning behaviors (Teaching)

d) student ability to assume a high degree of personal and professional responsibility (Professional Responsibility)

Program Benefits

1. Experiences in each instructional module within the Curriculum and Instruction Element are structured with a breadth and depth of involvement appropriate for each student or teacher as dictated by his unique interests, needs, characteristics and capabilities. Each module includes various levels of sophistication and forms of learning experiences, ranging from functions on the parateacher competency level to those

on a specialist or master teacher level. As McIntosh has stated, "The differentiated nature of the school staff should ensure access by learners to a variety of possible role models."[1]

2. Functions and behaviors basic to successful teaching are identified and described in measurable terms. The individual competencies and personal qualities of each student are thoroughly analyzed in relation to various skills necessary to perform the many operations in curriculum, instruction, teaching and learning.

3. The laboratory and clinical aspects of the Curriculum and Instruction Element intersect with all of the other elements, providing more extensive opportunity for actual application of the skills, concepts and behaviors which emanate from each separate element.

4. Data are continually and systematically gathered as the student engages in activities within the element. These data are used to assist him in making appropriate decisions in his development as a unique teacher with distinct functions and responsibilities.

5. For the university faculty, the Curriculum and Instruction Element provides expanded channels of communication through the use of television, picture phone and traveling laboratories with the public schools. Not only does the student have a seminar study within the context of the public school, but the professor can immediately relate theory to practice. Greater congruency between the teaching preparation curriculum and the operational curriculum is facilitated. Close and continuing communication between the university teacher and the clinical teacher should evolve.

6. For the public schools, the Curriculum and Instruction Element offers similar benefits. Differences in the study of teaching by the beginning student and the experienced student (certified teacher) is primarily one of sophistication. The talents of clinical, public school, university and college personnel can be integrated in a continuing study of the basic processes in education.

7. The WETEP model for relating study to the practice of teaching will be of benefit to other colleges or programs of higher

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[1] Robert Gordon McIntosh, "An Approach to the Analysis of Clinical Settings for Teacher Education," published address (The Third Florence B. Stratemeyer Lecture) delivered to AST Chicago meeting, February 19, 1968, p. 28.

education. Concepts and ideas for more effective participation of the teaching profession in the preparation of its prospective members will be continually developing and these ideas disseminated to other teacher education institutions. Different and flexible school settings will be utilized and their relative applications shared with educational designers.

Types of Instructional Modules

In an individually tailored program, each student will pursue a systematic and sequential study of those teacher functions necessary for effective instruction in any area. This sytematic development will include the diagnosis of learner needs and the inventorying of data sources. It will proceed through the development of learner-focused objectives, lesson plans and ways of organizing for teaching, learning and evaluation. The development will culminate with the practice of a number of different types of teaching involvements. There are seven aspects to this development process which are reflected by the types of modules within the element.

1. In learning to diagnose individual learners' interests and needs, WETEP students will spend considerable time working with stored data and studying student records. In so doing, they will be learning the techniques of computer-student interaction. These experiences with a teletype terminal will be expanded upon in laboratory sessions where practical work will be done in the analysis and use of collected data. In conjunction with this lab work, large group sessions will be held to better gain an overview of this subelement as it relates to others. Subsequent student-faculty contacts will be made in small group seminars and individual conferences. Considerable time in the Curriculum and Instruction modules will be spent in laboratory experiences, analyzing and observing teaching-learning behaviors.

2. In learning to inventory, analyze and evaluate the accumulated knowledge of the teaching profession, the student will rely on extensive laboratory experiences. Through work in the labs, students will learn to organize relevant professional materials, written and unwritten, and to interrelate data gained from the different elements. He will learn to develop and apply criteria for the assessment of various data. It will be possible for him to further explore and clarify these concepts in seminar sessions with staff and other students.

3. In planning and organizing for instruction, the WETEP student will learn to formulate appropriate learning objectives and instructional activities. A variety of technological strategies, programmed instruction, audio and video tapes and computer-assisted instruction can be used in the development, presentation and analysis of behavioral objectives. A considerable amount of time is spent in independent study as the student learns such concepts as how to select content through which learning behaviors are to be developed, or how to apply knowledge of individual differences to these objectives and learning activities. Personal converences between students and their faculty advisors will provide the evaluation of these tasks.

4. In learning to select appropriate teaching strategies and learning activities for the realization of objectives, time is given to a large group session for an overview of approaches and philosophies. Integrated media modes, video tapes and slides facilitate some large group presentations. Interspersed with seminar sessions are several hours of independent laboratory study during which students will gain practice in choosing appropriate resources for the realization of specific learning objectives.

5. Students will have many opportunities to assume teaching roles before they begin to work with children. The use of filmed simulations, videotaped microteaching episodes and role-playing with small groups give students practice in facing many of the decisions teachers have to face.

6. Students will have many opportunities for observation of and participation with children in schools. In these modules, students will be particularly observant of individual pupil personalities, needs and behaviors. They will analyze classroom learning experiences for what they contribute to meeting the needs of a given child. They will gain initial skill in guiding the learning of individual or small groups of children, and will begin to understand the problems involved in organizing school time for meaningful learning.

7. Culminating experiences in the preparation for teaching will be the implementation of teaching theories in actual learning situations. A considerable portion of some modules will be spent in clinical experiences with children in schools. In these modules, students will engage in continual self-appraisal of both their personal and professional qualifications for teaching. They will assist classroom teachers with planning, supervision and evaluation activities in an extended period of internship, gradually achieving complete responsibility in the many roles of a professional teacher.

Instructional Mode Benefits

Since data storage and management by computer is integral to WETEP, and a significant part of the Curriculum and Instruction Element is involved with a study of teacher characteristics, behaviors and other data, computer applications to this element are many. In several modules within this element, the WETEP student has an opportunity to experience interaction with a computer through the use of a teletype terminal. Thus the advantages of extensive data storage with easy retrieval which accrue to computer-assisted instruction are demonstrated to the student as a natural part of his teacher preparation.

Individualized laboratory work, such as that pioneered in the NEXTEP Project at Southern Illinois are an integral part of the Curriculum and Instruction Element.[1] Not only will individual laboratories be designed to develop such teaching strategies as value clarification or inquiry methods, but laboratories will also be available for small groups. In these latter labs, group dynamics and interpersonal relations will be analyzed and counseling afforded with the emphasis more on personality and personality characteristics than on specific skills or teaching techniques. In this way the unique development of each teacher is assured. Various applications of media serve to graphically portray to the student the functions, operations, and behaviors of teachers.

Personal, individual contacts with faculty members are available regularly to students through frequent seminar sessions and periodic conferences with professors. This will insure a humanistic quality essential to the spirit of WETEP.

A variety of clinical experiences are engaged in as the WETEP student learns to apply his theoretical knowledge to practical situations. From pupil observations, to role-playing, to the use of simulations, to real teaching experiences in classrooms, the WETEP student will learn to recognize and perform the roles and responsibilities of the professional teacher.

The greatest contribution of this element will be the direct linking of instructional mode and task as the prospective teacher extends his activities from the college classroom to the elementary

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[2] Kathleen Amershek and Chandler Barbour, "Innovative Ideas in Student Teaching," Innovative Programs in Student Teaching, Roy A. Edelfelt, ed., Maryland State Department of Education, Baltimore, 1969, pp. 15-16.

school classroom. Student activities begin with large group instruction, reading, and discussion sections. Simulated activities via computer, video tape, film, programmed instruction and role-playing provide guided practice. Finally actual field work, utilizing micro-teaching and videotaping for continuous self-analysis and improvement, culminate the pre-service preparation. The planned, efficient use of these various modes of instruction can eliminate the haphazard and inefficient, semi-guided and loosely structured, clinical experiences of present teacher education programs.

EARLY CHILDHOOD EDUCATION

David C. Davis

Introduction and Abstract

The effects of early childhood education on later achievement have been well documented.[1,2] It follows that an elementary teacher benefits from study in the area of learning by the very young child.

Content within the Early Childhood Education Element is designed to meet a teacher's need for understanding in the area through three non-sequential subelements: 1) Instruction, 2) Curriculum, and 3) School. Prerequisite to entering this element is successful accomplishment in selected modules of the Educational Psychology Element. Instructor assessment of individual needs, strengths and limitations in relation to this element will take place prior to student entrance into it. Program prerequisites will consist of optional modules from within the Culturally Diverse, Media and Technology, Curriculum and Instruction and Communication Elements.

A student data chart will be devised to profile prior student experience in the individual pattern of modules taken before admittance into Early Childhood Education. This profile will also record the following information about the student entering and remaining in the Early Childhood Education Element: 1) dialect pattern, 2) idiolect (individual speech/paralanguage) pattern, 3) service experiences, 4) home-family factors, 5) special abilities, 6) statement of interests, 7) hobbies, 8) physical aspects, 9) travel experiences and 10) the student's statement of future professional interest and direction.

Program Benefits

In the WETEP approach to the element instruction design, the benefits begin with faculty-instructor preparation which supplements traditional course patterns and study guide material, with their predominantly alphabetical code system of communication, and encourages instructors to select from at least four other established basic code systems: idea code, work code, electronetic code, and graphics. (The reader is now reading a predominantly alphabetical code system

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[1] Jean Piaget, "Principal Factors Determining Intellectual Evolution from Childhood to Adult Life," in E. L. Hartley and R. E. Hartley, editors, Outside Readings in Psychology, 2nd ed., Crowell, New York, 1958.

[2] Benjamin Bloom, Stability and Change in Human Characteristics, John Wiley and Sons, New York, 1964.

for communicating the thoughts for this element design.) The use of graphs or diagrams would introduce the idea code pattern for a more comprehensive statement. Each of these code systems contributes to distortion-free communication understandings between sender and receivers. Content within modules is more efficiently presented when communication code systems are thoroughly identified and graphically applied to core knowledges and concept identification.

An example may be found in Module 5, Events 4 and 5 of this element, where an electronetic-graphic code system is used to insure student recognition of basic elements in a pupil learning environment, such as play. Using slides and films (Events 4 and 5) it will be possible to pinpoint essential elements of play such as adventure, risk, individual selection, material, knowledges, time, and persons which are within the content of the event. The efficient use of these available code systems for presentation of the desired content averts major distortion on the part of receivers.

Exploration in selecting the best code system to apply to knowledges within an event is exciting and intellectually rewarding to faculty participants even before student understandings are achieved and before the ultimate benefactors, the classroom pupils, are reached.

Students exposed to this approach within the element modules soon discover the non-sequential nature of applied knowledge and develop a realistic sense of responsibility for making selections among the options provided. Students develop more individual respect for core content and theoretical positions when they take the initiative in selecting which mode of learning and which module order they personally prefer. Past experience with multi-media presentation of course content to professional students verifies that in this way they learn to fathom the system of communications devised by man as the key to clear concept analysis.

While classroom pupils will be the third population to benefit from this system design, when the faculty-instructor and professional student become knowledgeable about efficient code system-media selection, pupils will be given opportunities to benefit from learning situations which incorporate this approach to communication.

Types of Modules

The Early Childhood Education Element employs several basic types of modular components: Those essentially involving information transmission, such as Module 1 (Planning) which relies heavily on the use of reading materials, films and video tapes, and on discussion in seminars, those stressing laboratory work, construction of learning materials or practice sessions, like Module 2 (Organization), those involving the observation of children, like Module 4 (Learning Environment) which employs films, tapes and slides in addition to live observation of children, and those which offer clinical teaching experiences with children, such as Module 6 (Home-School Relationships).

Instructional Mode Benefits

It is becoming apparent to learning theorists that the modes of communication are as important as strategies of teacher-student-pupil instructional patterns and that, for efficient learning, analysis should be made of several factors of every participant's role in the educational program. These factors, 1) identification of specific content and objectives within the element, 2) selection of appropriate modes for learning governed by content and personal considerations, 3) time, reasonably assigned for learning, and 4) student-pupil-instructor roles in conceptualizing content, are paramount for measurable learning.

The instructional modes used in all modules of this element will be governed by these factors. Students are provided alternative paths to select instructional modes which should satisfy their unique interests and learning strategies. Thus, in the Home-School Relationship module, a choice is offered between spending two hours in seminar discussion or spending five hours in reading. In the Assessment module, student specialists in Early Childhood Education may choose among three hours of model construction, five hours of reading or two hours of clinical experience. Decisions involving mode applicability will be made in reference to the WETEP paper on types of learning and relative mode effectiveness.[3] Having themselves been able to select modes related to their own abilities and needs, WETEP teachers will have had first-hand experiences which will provide insights necessary to provide individualized experiences for the children they teach. For the first time, perhaps, teachers can be told, "Teach as you were taught."

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[3] John M. Kean and Margaret A. Sterner, "Benefits of Systematically Relating Objectives and Instructional Media Through Appropriate Applications of Learning Principles," WETEP Feasibility Study, Vol. V: Program and Support Systems, School of Education, University of Wisconsin, Madison, Wisconsin, 1969.

CULTURALLY DIVERSE

John M. Antes

Introduction and Abstract

Eighty per cent of the United States population now resides in large metropolitan areas where the numbers of culturally diverse children are increasing. Many children consequently are handicapped by living, working and playing only with persons of their own racial, ethnic and religious group. This educational deprivation is particularly serious for groups of American Indian, Afro-American, Mexican American, and other minority group children, including those from low socio-economic backgrounds. Unless classroom activities are fortified by extended energies directed at this basic problem, pupils will be forced to rely on stereotyped ideas, often dangerous and distorted, about people from diverse backgrounds.

If educators are to free each student to become the best that is in him to become, their efforts, educational, social and psychological, must be directed toward the analysis of problems which minority groups face in obtaining an education in schools not designed for their needs. The Culturally Diverse Element of WETEP is designed to imbue all candidates for degrees in elementary education with an understanding of culturally diverse peoples. It is a critical element for any teacher education program aimed at schooling in the 1970's and beyond. The element is built on the assumption that all teachers, whether specifically teaching culturally diverse children or not, will best be able to awaken their pupils to the problems faced by poor and minority group people when they have thoughtfully involved themselves in an examination of these problems.

In WETEP, each student, through interaction with members of the professional staff of the university, the school, the culturally diverse community, and his classmates, is provided an opportunity to study in depth the poverty, discrimination and deprivation which frequently besiege culturally diverse pupils. Three subelements have been defined so that students will be able to identify, understand, and appreciate the basic problems involved: 1) Societal and Cultural Influences, 2) Physiological and Psychological Influences, and 3) Learning Influences (Curriculum and Instruction).

Program Benefits

1. Problems in society associated with the education of children from culturally diverse backgrounds are not confined to those schools in which predominant numbers of these children are found. All WETEP teachers assume a basic responsibility to

help every pupil to become aware of the nature of the problems which exist. A major benefit of this element is that it provides all WETEP teachers some experience in this area and thereby a certain level of awareness of the issues involved.

2. The Culturally Diverse Element provides not only for the education of basic level WETEP students, but it offers a comprehensive program to those teachers dedicating their professional lives to working with culturally diverse children, and to in-service teachers who desire to develop more expertise in working with the problems of rural and urban ghettos.

3. In completing this element, the WETEP teacher will develop a greater awareness of and sensitivity to the life styles of culturally different people and will thereby be better able to appreciate the positive aspects of different cultures and their contributions to the cultural wealth of the country.

4. Teachers who can identify the cultural and societal factors which influence educational deprivation are better prepared to meet the psychological and physiological needs of children suffering such deprivation. WETEP teachers benefit from the opportunity to participate in the study of human ecology in the basic environment of a culturally diverse child by spending one week living with an Indian, Afro-American or white family. This is followed by a semester working in an elementary school in that same community.

Types of Modules

The modules within the Culturally Diverse Element permit careful scrutiny of virtually every dimension of the influences bearing upon cultural differences. Because the types of modules reflect the purposes of each subelement, modules will be discussed under these headings.

1. Societal and Cultural Influences Subelement. Studies will be undertaken on such subjects as influences of the peer group, competition and cooperation in the education of Indians and Afro-Americans, school program development for minority groups and the role of Black power groups or of the inter-tribal council. While various media may be used in the transmission of information, readings, films, programmed instruction, an emphasis will be on participation in field study where, through trips, visits, observations and laboratory experiences, students may become immersed in subjects relating to the influences of diverse backgrounds on the learning of children.

2. Psychological and Physiological Influences Subelement. Many factors associated with the process of learning, the dimensions of personality and the expressions of personality will be studied within this subelement. Basic information related to psychological theories of learning and development having direct bearing on the Culturally Diverse Element will have been obtained in the Educational Psychology Element. In this subelement, modules have been designed to explore such specific topics as the physical-motor characteristics of Indians observed through their dance, music and art, and the roles of self-esteem, sex identification and aspiration in personality process. With the stress on cognitive understandings in these modules, wide use will be made of the information transmission media, reading, films, tapes, programmed instruction, as well as actual observations of children and discussions with professors and fellow students in seminars and conferences.

3. Learning Influences (Curriculum and Instruction) Subelement. Cognitive Learning about the culture and education of culturally diverse children is inadequate to fully understand their characteristics and needs. It is even less adequate as the necessary catalyst to evoke essential changes in attitude. This subelement relies exclusively on laboratory and field experiences which include observations and visitations to schools, reservations and ghettos. Perhaps the most significant single experience in this subelement is the study of human ecology in the basic environment of the child.

Instructional Mode Benefits

To read, to question, to listen to others discuss and analyze problems of the culturally diverse is necessary, and considerable effort is expended in readings, the use of tapes and films, and simulated laboratory experiences. Small seminar sessions and individual conferences with professors offer students the opportunity to analyze and evaluate the problems of the culturally diverse. But the focus of this element is the study of human ecology in the basic environment of the child. Only the student who actually lives in the community and makes a thorough study of all environmental influences on the child can actually feel the problem as it exists.

The WETEP student synthesizes the knowledge from campus and community study by actually teaching children from culturally diverse backgrounds, thus putting into practice a commitment to contribute to the elimination of the problems still attendant to culturally diverse populations.

SPECIAL EDUCATION

James F. Billingsley

Introduction and Abstract

Participation in the Special Education Element is designed to provide the WETEP teacher with attitudes, knowledge, and skills needed to work effectively with children with severe learning problems. There is considerable variety in the combinations of factors which may interfere with relatively normal learning processes.[1,2] It is the task of this element to present to the student a body of knowledge in a manner which will enable him to make meaningful observations and evaluations of the educational potential of exceptional children. On the basis of such assessments, the student must subsequently be able to develop and implement effective learning experiences for the child. For the WETEP specialist in Special Education, this implementation may mean modifying the scope and sequence of the curriculum, or specifically changing methods and materials; helping children to adjust more effectively to peer or authority relationships; working more closely with the parents of exceptional children; cooperating with special consultants on evaluation and remediation of learning problems.

WETEP teachers with a Special Education emphasis will gain the understanding in these areas to provide support to regular classroom teachers working with children who can profit from a regular classroom assignment. In addition, the Special Education Element provides them the background necessary to deal with severe learning problems in special groupings and environments, from tutorial situations to special residential diagnostic and treatment centers.[3,4,5]

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[1] L. M. Dunn, Exceptional Children in the Schools, Holt, Rinehart, and Winston, New York, 1963.

[2] S. A. Kirk and Barbara Bateman, "Diagnosis and Remediation of Learning Disabilities," Exceptional Children, 1962, Vol. 29, pp. 73-78.

[3] L. F. Cain, "Special Education Moves Ahead: A Comment on the Education of Teachers," Exceptional Children, 1964, Vol. 30, pp. 211-217.

[4] G. O. Johnson, "Special Education for the Mentally Handicapped--A Paradox," Exceptional Children, 1962, Vol. 29, pp. 62-69.

[5] S. B. Sarason, K. S. Davidson, and B. Blatts, The Preparation of Teachers: An Unstudied Problem in Education, John Wiley and Sons, New York, 1962.

The Special Education Element is composed of subelements calling for a variety of behaviors necessary to planning educational programs for children with severe learning problems. These subelements focus on a study of learning defects, philosophical and theoretical bases for special programming, specific curriculum planning, the use of materials and media, assessment procedures, and the uses of other professional and community resources.

Program Benefits

The development of the Special Education subelements and the modules within each subelement will provide opportunities for constant evaluation and modification of Special Education approaches. A prime concern of the Special Education Element is the design of increased and significantly more relevant person-to-person contact between the WETEP staff and the student. This element should be a model for personal involvement and for awareness and utilization of individual differences that the student can use in his work with children.

As in the modules of the other WETEP elements, there are three levels of educational experience: a Basic level that is needed by all teachers; a Specialist level which is organized around the knowledge and skill needed by teachers working primarily with children with severe learning problems; and an In-service level designed to enhance already possessed skills and knowledge, thereby creating master teachers in the special area. The differentiation of educational experiences between the Basic, Specialist, and In-service students is accomplished through the students' own selection of modules. In addition, opportunities are available for students to choose the level of sophistication of experiences they will participate in within modules.

The foundation of educational programming for children with learning problems is necessarily broad.[6,7] The value of careful coordination of special education programs with other programs in education is obvious. Occasionally, however, the "specialness" has interfered with, rather than enhanced, public education and teacher education programs.[8] Therefore, the Special Education

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[6] Romaine P. Mackie, H. M. Williams, and L. M. Dunn, Teachers of Children Who Are Mentally Retarded, U. S. Office of Education Bulletin No. 3, Government Printing Office, Washington, D. C., 1957.

[7] R. F. Heber, "Standards for the Preparation and Certification of Teachers of the Mentally Retarded," Mental Retardation, 1963, Vol. 1, pp. 35-37, 60-62.

[8] Johnson, op. cit.

Element has been carefully integrated with other WETEP elements. Modules within the Curriculum and Instruction, Communications, Educational Psychology, and Mathematics Elements and their related clinical experiences are particularly significant.

Types of Modules

The development of specific modules in the Special Education Element may and should vary extensively; however, a pattern appears in this element in which the modules are of three general types.

Attitudinal change. One type of module is designed to develop an increased awareness and understanding of significant educational concepts, i.e., the role of the school in providing for individual differences, the significance of special curricula for the exceptional child. Involvement in special observations and seminars is particularly meaningful in this type of module.

Knowledge. The second type of module has as its prime focus the learning of specific information in a defined area. This process is implemented through the use of programmed instruction, multimedia presentations, and computer-assisted instruction.

Application and Assessment. The third modular organization reflects efforts to promote skills in the development of teaching-learning sequences for children with severe learning problems and in an assessment of their behaviors. The goals in these modules are primarily related to improving students' direct contacts with special children. Factual knowledge is integrated into laboratory experiences and into the somewhat more independently organized clinical experiences. The program for students within the element is as diagnostic as the learning experiences proposed for children.

Instructional Mode Benefits

Where possible, students are provided with opportunities for direct contacts with children in special education situations. Personal contacts and selected observations provide them with sensitivity to learning difficulties and suggest techniques for dealing with these problems. The work of students with children is, in many cases, monitored by television to enable the WETEP staff to make specific recommendations to the prospective teacher while avoiding any disruptive influence their presence might cause.

The relatively small percentage of children with severe learning problems, however, has created proportionately few opportunities for students in traditional teacher education programs to obtain the experience necessary to work easily with such children. In WETEP, carefully programmed media increase the student's awareness of the variety and complexity of learning problems presented by children.[9,10,11] The use of prepared situations such as those included in microteaching, and more efficient presentation of content through the use of such media as films or video tapes facilitate an understanding of the need for, as well as the actual development of, a background of knowledge and skills for working with exceptional children.

Involvement in seminar discussions provides students with opportunities for depth analyses of special problems and for interaction with students and faculty members in their special area.

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[9] W. R. Carriker, "Review of Significant Research in Teacher Education," New Frontiers in Special Education: Selected Convention Papers, The Council for Exceptional Children, Washington, D. C., 1965, pp. 256-259.

[10] D. M. Medley and H. E. Mitzel, "Some Behavioral Correlates of Teacher Effectiveness," Journal of Educational Psychology, 1959, Vol. 50, pp. 239-246.

[11] C. Meisgeier, "The Identification of Successful Teachers of Mentally or Physically Handicapped Children," Exceptional Children, 1965, Vol. 32, pp. 229-235.

PART II

BENEFITS

Benefits to be derived from WETEP may be associated either with parts of the program or with WETEP as a total system. Benefits described in Part I of the volume are associated with specific elements. Those benefits described in Part III are associated with WETEP support systems. The most important of the several sets of benefits are those associated with the total operational WETEP. These benefits are discussed in Part II.

The papers in this section examine factors expected to improve the quality of elementary teacher education (and hence the quality of the output from WETEP) and factors expected to increase teacher retention (and hence the quantity of output from WETEP). The studies presented suggest ways by which substantial evidence of measureable benefits can be ascertained from a fully functioning WETEP.

The media and learning principles paper relates the character of specific kinds of learning experiences to a variety of media available to accomplish most efficiently and effectively the instructional objectives of WETEP. Kinds of learning, applications of learning theories, and the benefits to be derived from the use of appropriate media within the WETEP program are discussed.

The teacher effectiveness paper examines briefly the background research on teacher effectiveness and indicates specific ways in which the study of teacher education can be conducted within WETEP. Benefits of research in teacher effectiveness are delineated.

The student retention paper discusses the background of information on retention, presents an analysis of student retention at the University of Wisconsin and discusses benefits of the WETEP program to elementary student retention.

The teacher retention paper describes teacher attrition and the manner in which WETEP may influence its graduates to remain for longer periods of post-graduation service in the elementary school.

The benefits described in this set of papers represent direct benefits which can be discussed at this time. Indirectly, WETEP may be expected to contribute to the continued development of curriculum theory, instructional strategies, style of learning of young adults, institutional change patterns in higher education and other areas related to the education of teachers for children.

The results of these analyses indicate that anticipated benefits include: learning efficiency will be improved through the selection and use of more appropriate media; more effective teachers will be prepared for the schools of tomorrow; more students will successfully complete the program; and more graduates will stay in teaching as a result of WETEP influence.

BENEFITS OF SYSTEMATICALLY RELATING OBJECTIVES AND INSTRUCTIONAL MEDIA THROUGH APPROPRIATE APPLICATIONS OF LEARNING PRINCIPLES

John M. Kean
Margaret A. Sterner

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Introduction

Teacher educators have long sought ways to improve instruction in such ways that all students reach satisfactory levels of achievement in reasonable amounts of time. Many procedures in the past have not resulted in satisfactory achievement, partly because they have been fragmented, and partly because the procedures of one era have continued to be used in the next. WETEP is designed to improve instruction in teacher education through procedures which emphasize individualization rather than standardization. Individualization will be accomplished by extending the quantity and the quality of personal contact between students and faculty and by utilizing modern technology to optimize choices for learning.

This paper relates the character of specific kinds of learning experiences to the variety of media available in order to accomplish the instructional objectives of WETEP. For this purpose media includes all resources ranging from the children in the schools and the faculty on campus to television and computer-assisted instruction. Controversy and inconclusiveness surround ideas that support the use of technology and media other than humans in the schools. Many authors suggest that current research provides little evidence to support the concept that any given media contribute more to learning than any other media. On the other hand Edling writes that research and development activities involving media have:

a) helped clarify educational objectives

b) contributed to the analysis and design of media that produce the specific learner behavior identified

c) utilized learner responses to refine and develop more predictable learning experiences

d) clarified the need for specific instructional strategies to attain given objectives

e) provided new potentialities to determine whether or not educational objectives have been obtained[1]

The authors of this paper acknowledge with grateful appreciation the criticisms and suggestions of Dr. Thomas Ringness of the Department of Educational Psychology, University of Wisconsin, Madison.

[1] Jack V. Edling, "Educational Objectives and Educational Media," Review of Educational Research, Vol. XXXVIII, No. 2, p. 189.

McLuhan states that "It is too late to be frightened or disgusted, to greet the unseen with a sneer. Ordinary life-work demands that we harness and subordinate the media to human ends."[2]

In order to most effectively harness these media for the education of teachers considerable effort will be required to analyze and to refine the prototype instructional materials for WETEP until they are demonstrated to be effective. As a beginning of that effort, this paper examines the potential benefits of specific media to specific tasks in the education of teachers. It discusses kinds of learning, theory, applications of learning theories, and the benefits expected from a variety of media uses within the WETEP program.

Learning Principles

To insure that the methods and techniques used are the most appropriate for the situations in which they are used, one must begin with a concrete understanding of the nature of the content to be taught. One must also have an understanding of the various types of learning possible and an understanding of the ways and conditions in which the learnings can be acquired and used. One may then construct a clear, concise set of objectives for each element, indicating the content to be learned or the use to which the knowledge will be put, and the performance expected of the student once the learning has been complete, including some means of assessment. It is then possible to choose wisely among the media and technological devices available in order to create for each learning objective an atmosphere most conducive to acquiring that particular objective.

Margaret Ammons[3] has outlined the organization of the WETEP components, elements and subelements as they are related to the patterns of objectives presented by Benjamin Bloom, *et*. *al*.[4]

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[2] Marshall McLuhan, *Counterblast*, Harcourt, Brace and World, Inc., New York, 1969, p. 53.

[3] Margaret Ammons, "Cognitive and Affective Levels in Teacher Education," *WETEP*, *Vol. I: Position Papers*, School of Education, University of Wisconsin, Madison, Wisconsin, 1969.

[4] Benjamin S. Bloom (editor), *et*. *al*., *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain*, David McKay Company, New York, 1956. (Hereafter referred to as Bloom's Taxonomy.) David R. Krathwohl *et*. *al*, *Taxonomy of Educational Objectives: Handbook II: Affective Domain*, David McKay Company, New York, 1964.

This basis for the WETEP objectives together with learning theory gives direction to the choice of instructional media.[5] An analysis of appropriate media for instruction must examine what particular strategies, and what types of interaction seem most facilitative for structuring the environment for learning.

Arnstine has defined learning in a broad context as the

> ". . . process by which dispositions are acquired . . . the acquisition of knowledge, skills, attitudes, and overt acts are all involved when dispositions are acquired. To this extent, then, this usage of learning embraces most of the learning outcomes (as well as some of the processes by which those outcomes are achieved) . . ."[6]

Learning, most simply defined, is a retainable change in human disposition or capability not ascribable to the process of growth. Learner characteristics, stimulus situation and response on the part of the learner are the necessary elements in the learning event. Learning is said to take place when there is an observable change in the learner's performance affected by the introduction of a stimulus situation.

Behavior can change in many ways, depending on the conditions involved in inducing that change. Much of what is learned occurs in an unorganized fashion, resulting in behaviors which may or may not be desirable, as when a student learns not to go to class because he has found lectures uninteresting. In order to design effective learning experiences, it becomes necessary to examine the types of learning which can occur and the conditions under which each type of learning can most easily be accomplished, to formulate specific behavioral objectives, and then to match them with the most appropriate instructional techniques.

The psychology of learning, including the development of learning theories, has had a long history, producing many models, yet only recently has the work been directed toward the analysis and investigation of the educational and instructional process in schools.[7]

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[5] Charles Sullivan, et al., "The WETEP Media and Telecommunication System," WETEP, Vol. I: Position Papers, describe initial plans for media usage.

[6] Donald Arnstine, Philosophy of Education: Learning and Schooling, Harper and Row, New York, 1967, p. 44.

One of the most comprehensive models for the types and conditions of learning is that presented by Gagne. He has proposed a taxonomy of types of learning which have implications for the selection of media for instruction.[8] The Gagne thesis has been relied upon because he has presented a model which seems sufficiently close to the implementation model envisioned by the WETEP staff, because it offers interesting possibilities for research on instruction in universities and because it appeared to the authors that although Gagne begins his types with basic conditioning, he does not assume this to be a sufficient way for structuring all higher learning which is envisioned for WETEP.

Gagne has outlined eight categories of learning which form a learning hierarchy, from simple to complex, with each succeeding category dependent upon learnings of the preceding one. It is hypothesized that through categorization of the WETEP learnings, it is possible to sequence the objectives in each element so as to ensure effective, permanent learning.

The following descriptions of Gagne's eight learning types and examples of WETEP applications illustrate this model as it applies to WETEP. It should be noted that the objectives selected from WETEP specifications are not "clean" in terms of the Gagne hierarchy. They all involve complexities of learning that would ordinarily force them into the higher levels of the Gagne types. But the writers, for the sake of consistency with the WETEP specifications from which the examples are drawn, have chosen not to rewrite them in new terms but to provide them as objectives which include many of the kinds of learning described by the summarization of Gagne's types of learning.

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[7] Robert Glaser, "Learning," in Robert Ebel (ed.), Encyclopedia of Educational Research, 4th edition, Macmillan Co., New York, 1969, p. 726.

[8] Robert Gagne, The Conditions of Learning, Holt, Rinehart and Winston, Inc., New York, 1965. Since Gagne's work underlies so much of what is said in this paper, the authors have chosen not to footnote references to him hereafter.

Learning Type	WETEP Application
I. The first category is signal learning, a simple stimulus-response situation similar to that of classical conditioning as explored by Pavlov. Signal learning usually involves conditioning an emotional response (R), typically not under voluntary control, to a signal (S) which did not originally evoke this response. In this type of learning an unconditioned stimulus evokes an unconditioned response within the learner. By closely following a particular signal with an unconditioned stimulus, the response becomes conditioned to the signal itself, (S----R). Much repetition is then required to prevent the extinction of the response.	I. Signal Learning. Signal learning and stimulus-response learnings are encountered every day. Although not presently prescribed in the program, WETEP is attending to such things as the "strength of anger" in a teacher's reaction to a noisy child, or the teacher's aversion to touching a Negro child because of some feeling about "black skin," or some other characteristic of a child. Through such processes as counseling and ecological study with diverse cultures, WETEP hopes to help teachers analyse their "signal learned" response to children and thereby change them if need be. There are now, however, no stated objectives which can be directly tied to signal learning.
II. The second type of learning, stimulus-response (S_s----R), involves making a precise psycho-motor response to a specific stimulus or combination of stimuli. These are voluntary acts, allowing the individual to perform an action when he wants to. Essential conditions to this form of learning are appropriate stimulus cues, appropriate reinforcement, contiguity of response and reinforcement and opportunity to repeat the stimulus-response sequence. Such repetition allows the learner to acquire kinesthetic cues to accompany the stimulus, increasing the probability of the correct response, as well as to permit a greater degree of stimulus discrimination.	II. Stimulus-Response. Examples of this type of learning would include reactions as simple as the teacher's automatic response to poor environment in the classroom, such as its being too dark or too warm. Again, the example given here is weak because it relates to assumed responses developed before entrance into a teacher education program. Here reactions to institutions, children, and subject matter are paramount. The experiences of WETEP as a whole are presumed to effect this type of learning in the teacher education program.

III. The next form of learning is chaining, in which two or more psychomotor responses are connected in an ordered sequence, (S_s----R S_s----R). Prerequisite to chaining is the learning of the individual S_s----R links. These may then be learned in sequence by providing appropriate cues, presenting the links successively in a short period of time, and providing feedback as to the correctness of the response and reinforcement of the behavior. Although the chains should be acquired quickly due to previous knowledge of the links, opportunity for practice or repetition of the chain must be provided in proportion to any lack of such previous learning and to overcome interference due to the length of the chain. Chaining may be either motor or verbal.	III. Chaining. 1. Given various types of audio-visual equipment and a set of operating instructions for each, the student will locate the basic parts of the machines, and operate the equipment. (Media and Technology, Vol. III, p. 109) 2. The student should demonstrate his ability to move with control on a relatively stationary base while employing a minimum to optimum range of joint actions. (Physical Education, Vol. III, p. 98) 3. The student practices each demonstration or laboratory activity prior to carrying on the activity in class. (Science Education, Vol. II, p. 214)
IV. The fourth step in the learning hierarchy involves verbal associations, that is, chains in which the S_s----R components consist of verbal or visual materials rather than psychomotor acts. In these chains, mediated or "coding" connections serve to link the S and R together. The simplest form of verbal association is naming, in which one learns to identify a particular object or phrase with another phrase.	IV. Verbal Associations. 1. The student can accurately read, play, and sing representative melodies. (Music Education, Vol. III, p. 132) 2. The student demonstrates competence in developing a personally expressive imagery in at least one medium. (Art Education, Vol. III, p. 35) 3. The student knows suitable interaction techniques for various classroom situations demonstrated by recalling and listing interaction techniques which may be useful in

Verbal chains are also represented by memorization of passages and lists (e.g. serial learning). These longer chains may be learned by the progressive part method in which the learner adds a new part as he continues to rehearse the older parts, or by the part-whole method in which the parts are learned individually and then joined together to form a whole. The number of parts to be learned is dependent upon the immediate memory span of the learner, with the maximum average about seven units at a time.

Successful learning of verbal associates requires first that both the links of the S_s----R chain and the mediating connections between each verbal unit and the next have already been learned as separate entities (e.g., the ability to say the words involved must be in the learner's repertory). The verbal units must then be presented in proper sequence with the learner actively making the required response. Learning is often aided by such external cues as mnemonic devices. Finally, there must be provision for confirmation of the correct response, providing reinforcement to the learner. Repetition is needed in order to aid learning of long verbal chains which might be subject to interference.

communicating with children in classroom situations (e.g., group dynamics, discovery learning, asking of questions). (Orientation, Vol. II, p. 23)

4. The student can list a number of standardized test materials for elementary school mathematics. (Mathematics Education Vol. II, p. 173)

5. The WETEP Social Studies teacher can list signs of value confusions in children. (Social Studies Education, Vol. II, p. 235)

V. Multiple discrimination learning is essentially a matter of establishing numbers of different chains enabling the learner to distinguish one object, item or verbalization from another. Multiple discrimination is subject to the phenomena of forgetting and interference, due to the fact that what has once been learned and stored is readily weakened or obliterated by other activities. Optimally, multiple discrimination does not involve learning new chains, but instead, strengthens old chains such that they are not subject to interference. Thus, prerequisite to multiple discrimination learning is the acquisition of individual chains linking each distinctive stimulus with the appropriate response. Methods must then be employed to ensure retention by making the stimuli as distinctive as possible. This is most frequently done by learning the associates one by one and then repeating them in a somewhat different order. Because it is unlikely that all links or chains have been learned individually prior to multiple discrimination learning, much repetition is required. As the number of stimuli increase and as they become more similar, interference increases, again necessitating more practice to ensure retention. However, the amount and

V. Multiple Discrimination Learning. 1. The student is able to recognize simple and complex movement patterns and to distinguish the basic movement elements involved. (Physical Education, Vol. III, p. 99)

2. The student knows and can distinguish a number of Standardized Reading Survey Tests in terms of their content, reliability, validity, derived scores, norms, administration and scoring procedures, and cost. (Communications, Vol. II, p. 120)

3. The student can distinguish the characteristics of each type of material and equipment in early childhood education. (Early Childhood Education, Vol. III, p. 139)

4. The student is able to identify arrangements of tone in melody, intervals, repeated tones and scale steps. (Music Education, Vol. III, p. 131)

5. Given a film presentation of a learning situation and a list of characteristics of the progressive education movement, the student can indicate which of the latter are depicted in the filmed example. (Educational Psychology, Vol. II, p. 67)

arrangement of the repetition is not fixed and must be determined individually. The final condition for multiple discrimination learning, as in all learning, is provision for confirmation of correct responses and reinforcement of those responses.

VI. The sixth type of learning is concept learning which enables the learner to put things into a class and then to respond to the class as a whole. In addition to distinguishing among things, the learner is able to respond to apparently widely differing items in terms of a common abstract property. In order to state that the learner is using a concept one must be able to demonstrate that the performance is impossible on the basis of simpler forms of learning. This can be done by presenting the learner with novel stimuli in novel situations and having him provide the correct response.

Concepts may be acquired by trial and error, but are usually presented more directly in terms of concrete examples and verbal cues. Prerequisite to the learning of a concept are the learnings prior to this step in the hierarchy. One must aid the learner in recalling relevant verbal associates and multiple discriminators.

VI. Concept Learning. 1. The student can define and distinguish among the following concepts:

a. Instructional media
b. Mediated instruction
c. Instructional technology

(Media and Technology, Vol. III, p. 107)

2. The student demonstrates knowledge of the concept of discovery learning by selecting from a list of learning principles those that are relevant to the discovery learning approach. (Educational Psychology, Vol. II, p. 67)

3. The student has knowledge of the essential mathematical concepts, processes, and skills which are to be learned. (Mathematics Education, Vol. II, p. 168)

4. Using a schema based on arbitrarily selected properties the student classifies objects or events and groups these phenomena into mutually exclusive categories (e.g., the student separates a set of objects into two groups according to those that have or do not have a single characteristic). (Science Education, Vol. II, p. 208)

In presenting the concept itself, several instances of the class are given along with differentiating verbal cues. As a check on the concept, the learner is then presented with a novel example and asked to identify it as belonging to that class, perhaps also telling why. This entire sequence may take only a few minutes, but all steps must be included in order to ensure that the concept will be understood and retained and has not become merely another verbal associate.

The acquisition of concepts allows the learner to generalize this concept to other different stimulus situations that have not played a part in the learning itself, freeing the individual from control by specific stimuli. By testing the generalization through presenting novel stimuli, the instructor can be sure that the learner has acquired the concept and is not merely responding to a collection of specific chains. It must be emphasized that demonstrations, lab experiences, and other active participations play a large part in concept acquisition. However, once the concept has been acquired, including the concrete referents, instruction may continue on a verbal basis, with the concept seemingly quite resistant to extinction, interference, or forgetting.

5. The WETEP Social Studies teacher can list and describe the following ways of initiating value discussions to clarify value situations:

a. Quotations
b. Pictures without captions
c. Scenes from a play or movie
d. Provocative questions
e. Other sources of material

(Social Studies Education, Vol. II, p. 235)

VII. The seventh type of learning includes principles, chains of concepts that make up what is generally called knowledge. They represent the relationships among concepts, in all the forms they may take.

Assuming that the student already has knowledge of the concepts involved, principle learning can be accomplished primarily through verbal instruction. The first step is a statement of the behavior to be expected when the learning is complete. Next, the relevant component concepts are recalled. Verbal cues may then be given for the principle as a whole, either by stating the principle or by giving examples of the principle. The learner is then asked to demonstrate the principle, either by an example or by stating the principle verbally. This is done to ensure that the principle has been learned, not as part of the learning itself. Contiguity between recall of the concepts and their ordering to form a principle, as well as reinforcement of the correct response, is essential. Repetition has not been found important for either the acquisition or retention of principles; however, review of the principles periodically is advisable.

VII. Principles. 1. The students understand the principles and elements of design as they function in the visual aspects of our culture. (Art Education, Vol. III, p. 35)

2. The students know the relationships of good physical and mental health to academic achievement. (Health Education, Vol. III, p. 48)

3. The student knows how prejudices are formed. (Culturally Diverse, Vol. III, p. 153)

4. The student knows that the school often becomes the scene of confrontation between exponents holding conflicting positions on social issues. (Orientation, Vol. II, p. 27)

5. The student knows the theoretical structures that influence the development of curriculums and materials in education. (Communications, Vol. II, p. 107)

VIII. The final step in learning is that of problem solving. Here the learner uses everything he has previously acquired in the form of S_s----R, verbal associations, multiple discriminations, concepts and principles in order to achieve some goal, thereby learning a higher-order principle which becomes part of his repertoire. It is the first encounter with a problem which involves learning, enabling the individual to repeat the steps later as required to solve the same or similar problems. Prerequisite to problem solving is the recall of relevant previously learned principles such that they are all present at the time the problem is to be solved. This can be done effectively through the use of verbal or visual cues. The instructor may then guide the learner in such a way that he discovers the higher-order principle (solves the problem) with a minimum of specific verbal help.

In the course of problem solving, the learner may learn or acquire strategies which will aid him in solving future problems. These strategies may be generalized to an entire class of stimulus situations embodying other problems of the same type.

VIII. Problem Solving. 1. The WETEP teacher is able to translate curriculum plans into operational teaching-learning behaviors. (Curriculum & Instruction, Vol. III, p. 11)

2. Given a concept to be taught using three types of mediated instruction, of which one is projected media, the student will demonstrate his ability to use projected media by:

a. Identifying instructional sequences that can be presented through the use of an overhead projector;

b. Writing a lesson plan that best sequences the presentation of all media for optimum concept acquisition;

c. Preparing the materials and teaching the projected media portion of the presentation to a peer group in a simulated classroom situation.

(Media and Technology, Vol. III, p. 111)

3. The student will select a microteaching situation and implement a given discovery learning lesson plan. (Educational Psychology, Vol. II, p. 68)

4. The student constructs a paper and pencil test that surveys phonic knowledge informally. (Communications, Vol. II, p. 135)

5. The student makes predictions based on inferences formed from observations, concerning the expected nature of given phenomena and uses experimentation to determine the accuracy of the prediction and the validity of earlier inferences (e.g., uses a series of related observations to predict an unobserved event). (Science Education, Vol. II, p. 209)

In addition to the hierarchy formed by the types of learning, there is inherent in each element of instruction a hierarchy of principles. This hierarchy presents a pattern of prerequisite principles such that one must be learned in order that the next may be fully understood. To determine the order the question should be answered, "What must the student know in order to be instructed in this principle or to solve this problem?" Once the order of principles to be learned has been established, the sequence of learning steps required for the acquisition of each principle can be planned. By taking into account the hierarchy of principles specific to each element, the hierarchy of learning types, and the conditions which are applicable to the learning of all principles, the most efficient and effective learning sequence can be outlined.

It should not be assumed however that all learning is either efficient or unilaterally effective in some specified direction. The WETEP program will stimulate creativity, self-understanding, motivation, self-actualization, and esthetic interests and is designed to "engineer" the attainment of those performance objectives. It is true that the WETEP program will gain control over a wide range of objectives in teacher education for the purpose of making the prospective teacher more competent and more efficient in the managing of instruction so that he can be freed to devote his energies to the creative potential and humanness of his pupils. This is also the goal for the WETEP faculty. The thesis that such a media-oriented program as is discussed here mitigates against the development of other types of innovative and worthwhile programs is rejected. Only by making the best possible use of the resources available, and by carefully analyzing the results, will it be possible to make the difficult policy decisions necessary to assure those educational outcomes which the faculty and the students consider necessary. In the discussion that follows greatest attention will be given to cognitive uses of knowledge, primarily because teacher educators are still operating upon only a very sketchy understanding of what is meant by affective learning. But again Arnstine has succinctly stated the case, "The dispositions of such people (teachers) did not appear miraculously at birth; they were acquired, whether by accident or design, over a period of time - and if they can be acquired at all, they can be acquired more effectively and more widely when they are deliberately and thoughtfully taught."[9]

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[9] Arnstine, op. cit., p. 371.

Accepting this statement, the designers of WETEP emphasize that the development of the program will take time and will be subjected to continuous study and revision if for no other reason than to guard against unintended side effects, such as depersonalization, which have become persistent and dangerous in the uses of technology today.

Uses of Knowledge

Meeting new goals and solving problems are processes which depend on the transfer of knowledge gained in the immediate and specific learnings outlined above. Beyond the mere acquisition of knowledge, involving the learnings outlined above, are the ways in which this knowledge may be used: comprehension, application, analysis, synthesis, and evaluation.[10] These abilities and skills are described as mental processes of organizing and reorganizing material to achieve a particular purposes. These skills and abilities form a hierarchy such that each succeeding skill is dependent to some extent on the preceding one. Thus, for example, in order to be able to effectively evaluate materials and methods, one must first be able to analyze the component parts, as well as reconstruct them to form a unique whole.

Prerequisite to actual transfer of knowledge is the prior learning of the knowledge to be used. Once verbal associations, multiple discriminations, concepts, and principles have been learned, teaching for transfer may be accomplished by presenting the learner with novel stimuli or problems which emphasize the transfer skill to be developed. The presentation of varied stimulus situations to ensure desired generalization is accomplished largely through verbal communication, as in a seminar.

The following descriptions and examples illustrate the transfer skills and abilities which are to be taught in WETEP.

Comprehension

Comprehension is the lowest level of understanding beyond the mere recall of a verbal associate or principle. The learner is able to deal with the material of principle being communicated without necessarily relating it to other material or seeing its fullest implications.

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[10] Bloom, ed., *et al.*; David R. Krathwohl, *et al.*, *op. cit.*

Comprehension has three subcategories, the first of which is translation. This involves the ability to accurately paraphrase or translate an idea from one language or mode to another. The second subcategory is interpretation. More than simply restating the idea, interpretation implies the ability to explain or summarize an idea by reordering or rearranging the material or viewing it in a different way. The third is extrapolation in which the learner is able to go beyond the immediate data to determine implications, consequences, and effects which may follow from the conditions or ideas given in the original communication.

Application. The next level of understanding, application, involves the use of abstractions in the form of general rules, procedures, principles, or theories in particular situations. Application differs from comprehension in that the student uses abstractions in situations where no mode of solution is specified.

Analysis. Analysis involves the breakdown of a communication, idea, or principle into its constituent parts such that the implied hierarchies and relationships between ideas and the organization of the principles involved is made explicit. In addition to recalling pertinent data, explaining the principles involved, and using those principles appropriately, the student is able to take a piece of material and determine relationships between principles.

Synthesis. Synthesis is the putting together of parts so as to form a whole. This involves arranging and combining the parts, elements, and principles from many sources to create a pattern or structure not clearly present before. This ability draws on all the others, as, for example, when the student must analyze the various sources of information for pieces relevant to the solution of the new problem.

Again there are three subcategories. The first is the production of a unique communication in which the student must convey ideas, feelings, and experiences to others. Although not expressly stated in the above objectives, synthesis is demonstrated in the student's ability to write a clear, concise report following the administration of a standardized reading survey test to a child. The second subcategory is the production of a plan or a proposed set of operations in which the student conceives of a way to solve a problem that is uniquely his own. This is illustrated in an objective which requires the ability to plan a unit of instruction for a particular teaching situation. The derivation of a set of abstract relations is the third subcategory. Here, either the student must begin with concrete data and then classify or explain it in some way, or he must deduce propositions and relations from a set of basic propositions or symbolic representations.

Evaluation. The final way in which knowledge may be used or transferred is in evaluation, making judgments about the value of ideas, works, solutions, materials, and methods for a given purpose. Either qualitative or quantitative criteria for accurateness, effectiveness, cost, satisfaction, or usefulness may be used. These criteria may be determined either by the student or by outside sources. Although evaluation involves value judgments which are in some way affective, the emphasis is still largely cognitive. Thus, objectively a method may be judged useful but due to subjective opinions may be rejected.

Judgments may be made in terms of internal evidence, such as logical accuracy and consistency as when one is asked to indicate logical fallacies in arguments. Judgments may also be made in terms of external criteria, such as the ends to be satisfied; the techniques, rules, or standards by which such works are usually judged; or a comparison of the work with other works in the field.

Once the student has been guided in the acquisition and various uses of the knowledge of principles presented, he is equipped to handle almost any problem which may arise concerning this material.

As the WETEP staff critically appraises this process in action then will begin to give greater consideration to affective learning and psychomotor learning. They will also develop greater facility in articulating those goals which are neither measurable nor necessarily observable in educating a teacher.*

Media and the Conditions of Learning

Prior to actual instruction, several decisions have already been made. First, the objectives defining the desired terminal behaviors of the learners have been clearly outlined. Second, the type of learning represented by each objective, its concomitant conditions for learning, and the ways in which the acquired knowledge will be used have been identified. And third, the sequence of learnings has been determined in accordance with the structure of knowledge inherent in each element and with the type of learning represented. The remaining question deals with the best ways to present the material in order to ensure maximum acquisition and retention.

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*Examples of the types of objectives discussed here may be found in WETEP: Vol. II and Vol. III.

WETEP, designed to utilize the most advanced media and technology possible, must draw not only on past experience and research, but also on its center for continuing research in teaching, learning, and media. The choice of media will be determined by the following steps:

1. Examining the media options with reference to past findings;
2. Deciding on the most effective, convenient, or economical media to be used;
3. Writing specifications for the selection, preparation or production, and utilization of materials;
4. Field testing materials produced to verify effectiveness;
5. Implementing validated materials.[11]

In order to begin this process, one must first consider the ways in which media will be used, i.e., the components of the instructional situation as they are related to the various types of media. These components, based on Gagne are common to all types of learning, with varying degrees of emphasis, and include the following:

Presentation of the Stimulus. If the stimulus is a chain, an external cue must be presented for each link until the links are established. If it is multiple discrimination, the stimuli must be displayed so that correct connections can become differentiated from incorrect ones. If concepts are being learned, a variety of events representing the class must be presented. For the acquisition of principles, the stimulus objects to which they apply must be represented to the student. And in problem solving, the problem situation must be presented and displayed.

Directing Attention and Other Learner Activities. This is not part of the learning sequence itself, but merely points out the actions that must be taken by the learner in order to create the proper conditions for learning, such as "Remember what the standardized reading survey test is supposed to measure," or "Press the button corresponding to your answer choice." These are usually presented verbally and may be in oral or written form.

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[11] Charles Sullivan, et. al., "The WETEP Media and Telecommunication System, WETEP, Vol. I: Position Papers, 1969, p. 96.

Providing a Model for Terminal Performance. The model, important in defining the learning goals for the student, may be presented in a variety of ways, most commonly by oral or printed communication.

Furnishing External Prompts. In beginning instruction in motor or verbal chains and multiple discrimination, external cues may be given to aid the learner in establishing the proper sequence of events and in increasing the distinctiveness of the stimuli. As learning progresses, these cues may be eliminated when they are no longer needed. These cues may take many forms. Pictures or diagrams may depict the sequence, and auditory or verbal cues such as mnemonic devices may establish the proper order. Verbal or visual cues may be used to increase distinctiveness of stimuli.

Guiding the Direction of Thinking. Particularly in learning principles and in problem solving, the recall of relevant concepts or principles aids in the solution. Such guidance, while allowing for "discovery," increases efficiency in learning by reducing the occurance of irrelevant "hypotheses."

Inducing Transfer of Knowledge. As most knowledge is to be used in some way, rather than to be merely stored in the learner's memory, transfer of knowledge can rightly be stated as an objective in itself. However, it may be a formal part of all learning sequences. The discussion group, in which problems are presented in the form of questions, is a common and convenient way to induce transfer of knowledge to novel situations. Discussion may be initiated by verbal questions, lab experiences, or even motion pictures. The problems may either be solved through group interaction or by each individual learner.

Assessing Learning Attempts. The extent to which the learner has attained an objective is constantly being assessed in the instructional situation. This is most often done by asking questions representative of the objective to which the learner must respond. These may be oral or written or even programmed, with either fixed or free responses, depending on the objective to be assessed.

Providing Feedback. Provision for feedback concerning the correctness of the learner's responses is closely related to both the learning and assessment processes. This information may range from a simple "Right" or "Wrong" to an extended evaluation of the learner's progress. Cues within the situation itself, as well as external confirmation may serve to provide feedback.

Modes of Presentation.

In the sense that instructional media refers to all components of the learning environment which provide stimulation to the learner, the teacher or professor is one of the most important of the media. However, in addition to student-professor contacts, the WETEP design includes numerous alternative modes of instruction that involve technological media. The modes of presentation of material which the WETEP faculty have included in the projected courses of study include the following:

1) Personal interaction (Oral communication)

   a. Conferences

   b. Seminars
      1. Discussion
      2. Role-playing
      3. Sensitivity training

   c. Large groups
      1. Demonstrations
      2. Lectures

   d. Lab-clinical experiences
      1. Microteaching
      2. Testing children

2) Instructional resources

   a. Readings
      1. Books
      2. Reference tools
      3. Journals
      4. Periodicals

   b. Three-dimensional materials

   c. Visual
      1. Slides
      2. Transparencies
      3. Filmstrips
      4. Pictures and photographs
      5. Charts, graphs, maps
      6. Chalkboards

   d. Audio
      1. Tapes
      2. Records
      3. Radio

- e. Audio-visual
    - 1. Video tapes
    - 2. Television
    - 3. Films
    - 4. Combinations of C and D above

- f. Programmed instructional materials
    - 1. Teaching machines
    - 2. Programmed texts

- g. Computer-assisted instruction

3) Field experiences

- a. Classroom observations
    - 1. Children
    - 2. Teachers

- b. Field study (Culturally Diverse)

- c. Clinical experiences (Internship)

4) Other modes

- a. Independent study

- b. Laboratory experiences

- c. Miscellaneous

In matching media to the instructional situation it becomes apparent that there are many options for each situation. No attempt has been made to create a one-to-one correspondence, but rather to ascertain for what purposes the various media are appropriate. and for what purposes they are inappropriate or only relatively effective.

A review of the literature reveals many journal articles dealing with instructional media. These include studies on comparative effectiveness, utilization, basic research, media-preference, and attitudinal and motivational research. Reviews of the literature may be found in such references as: Gage, N. L. (ed.) Handbook of Research on Teaching; Lumsdaine, A. A. and Glaser, R. (eds.), Teaching Machines and Programmed Learning; Glaser, R. (ed.), Teaching Machines and Programmed Learning, II; and May, M. A., Learning from Films.

Discussions of media and learning appear in Hilgard, E. R., Theories of Learning (3rd ed.); Bugelski, B. R., The Psychology of Learning Applied to Teaching; Gagne, R. M., Conditions of Learning; Briggs, Leslie, J. and others, (eds.), Instructional Media: A Procedure for the Design of Multi-Media Instruction, A Critical

Review of Research, and Suggestions for Future Research; Glaser, Robert, "Learning" in Encyclopedia of Educational Research (4th ed.); Twyford, Loran C. Jr., "Educational Communications Media" in Encyclopedia of Educational Research (4th ed.), and the April, 1968, issue of the Review of Educational Research: "Instructional Materials: Educational Media and Technology."

Such research shows that the use of technological aids, with certain limitations, can and does enhance the learning process. However, Campeau notes several shortcomings in the current literature as it is applied to the problem of selection and use of media as presented above:

1. Most comparative effectiveness studies do not provide evidence of equal coverage and emphasis in content by the media being compared.

2. No systematic investigation has been made of the relative contributions of media and the teacher when used in combination.

3. Few attempts were made to control for original ability levels of the students in comparison groups.

4. Relative effectiveness of various media is usually determined by a performance test, with little mention or regard for the reliability or validity of criterion tests.

5. Most research involves comparisons of conventional teacher instruction and some media form already in existence. Few attempts were made to assess the effectiveness of materials specifically prepared to present the comparison lessons.

6. Much media research fails to respond to the personal variables of visual and tactile orientations among learners.

7. In instructional research the functional links relating the stimulation of certain senses and the effect upon the sensibility of the other senses has not been resolved.[12]

In spite of the variation in quality among the current studies of media, they do provide some basis for tentative media selection, as well as helping to point the direction for future research. From these studies and reviews of the literature the following comments and generalizations can be made about the use of the various media in relation to their function in the learning environment.

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[12] Campeau, Peggie L., "Selective Review of Literature on Audio-visual Media of Instruction," Instructional Media, American Institutes for Research, Monograph No. 2, December, 1966, pp. 101-103.

1) Oral Communication. Oral communication (professor to student, and student to professor) is the most common and most traditional of the media and there are many situations in which it serves all the required instructional functions. Particularly in advanced forms of instruction, dealing with principles, problem-solving, and transfer of knowledge, the presentation of the stimulus can be effectively done verbally.

Oral communication, particularly with young children, is a most effective way to direct learner attention and activity. For later education, printed and pictorial materials may serve to replace oral instruction. In providing a model for terminal performance, oral communication is adequate, but shows no advantages over other media. Printed and pictorial materials may serve as well or better unless the required performance is an oral one.

In WETEP, sessions emphasizing transfer of knowledge will be presented primarily through personal interaction and oral communication. They may also provide feedback about the learner's progress. When teachers can be freed through the use of other media, from having to present basic knowledge, the quality of interaction and instruction in oral sessions should be improved.

a) Conferences, one-to-one communication between a professor and a student, are used at many points in the WETEP sequence to assess the student's past performance and to determine the direction of future progress. Conferences serve primarily to assess attainment and provide feedback, although they may be used to a limited extent in fulfilling other instructional functions.

b) Seminars, involving the interaction of a professor or professors with a small group of students, will be used most often as vehicles for transfer of knowledge. Stimuli or problems to be solved may be presented by a variety of means, but generalization and transfer of knowledge will depend quite heavily on the ensuing discussion by the participants. Seminars may also provide the setting for role-playing activities in which students may act out and apply previously learned principles. Sensitivity training, presented in the Orientatiation Element, may also take place in a seminar setting.

The success of the seminar, particularly in discussions, depends on the knowledge the student has previously acquired, with the primary function of the seminar being to induce transfer of knowledge. Seminars may also be used to assess attainment and provide feedback to the learner.

c) Large groups, involving a professor and many students, may be used for lectures or demonstrations which do not depend heavily on individual participation. Only a few instructional functions may be met by lectures. Lectures may inform the learner of the expected outcomes of learning by providing models of expected performance. However, due to inadequate control of student attention as well as the one-way rather than two-way communications flow, lecture can be expected to accomplish few other learning goals. Lecture settings may be used to present stimuli, either verbal or through other media, but should be followed by individual or small-group instruction to ensure achievement of the desired objectives. Although lectures have been the traditional mode for presentation of instructional materials for many years, lectures are used in WETEP only in the Orientation Element, and then on rare occasions.

d) Lab-clinical experiences, as proposed by WETEP, are in which the student applies his knowledge of teaching and learning in a small group setting prior to actual experience in the school. This will most often be done through microteaching experiences in which the student will demonstrate and apply all previously acquired knowledge in presenting a short, specifically directed lesson to his peers. Through the use of video tapes of the microteaching experience, it is possible to assess attainment of learning objectives and to provide feedback to the student concerning his progress.

Other lab-clinical experiences might include administering a test to a child, followed by presentation of an analysis and evaluation of the protocol. Video tapes may again be used to aid in assessment of the objective and to provide feedback to the learner.

2) Instructional Resources. Instructional resources include all those technological aids and devices which the student employs in his learning experience.

a) Printed media, including books, reference tools, journals, and periodicals, are a traditional part of the instructional situation, particularly in later education. As indicated above, many of the functions performed by oral communication may be fulfilled by using printed material.

Given the prerequisite knowledge, instruction through printed media is usually a rapid and effective process. Particularly when pictures and diagrams are combined with the printed text, a book can impart a great deal of information to the student.

Limitations in printed media the way the text is frequently derived from is constructed. Many texts are poorly written from the standpoint of clearly directing attention to important stimuli, prompting and guiding thinking, and providing for self-assessment and feedback. With practice and sophistication, the WETEP student should be able to perform these functions for himself, thus overcoming these limitations.

b) Three-dimensional objects, including either models or the actual object, are often used as aids to oral and printed media in presenting the stimulus. It has been shown that the use of such materials is most effective when the task to be learned involves the actual manipulation of such objects.[13] This is exemplified in WETEP as the student works with materials in the science lab, with instruments in the music lab, or with actual test materials in educational psychology seminars.

When objects and events are used to provide the basis for concepts, enabling future instruction to be based on verbalizations, they must be chosen carefully in order to truly represent the verbal associates, multiple discriminations, and concepts being presented.

The literature on the use of three-dimensional models is limited, and there is a great need for research to evaluate the relative effectiveness of various methods of using objects, as well as to analyze the characteristics which make them more effective than other aids for some learning.

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[13] W. H. Allen, "Audio-visual Communication Research," in C. W. Harris (ed.) Encyclopedia of Education Research (3rd ed.), Macmillan, New York, 1960.

c) Visual representations of objects and events takes many forms, including slides, transparencies, filmstrips, pictures and photographs, charts, graphs, maps, and chalkboards. The question of which to use depends not on which is "better," but on the situation, the audience and the availability of appropriate content in a given form.

Visual or pictorial materials are most often used to present the stimulus. Through the use of pictures, stimuli and events far removed from the classroom may be introduced. Prompting may also be done effectively through pictures, particularly in guiding a psychomotor chain such as operating audio-visual equipment. In this situation, the pictures may also serve to confirm the correct response on the part of the learner. Pictures can perform particularly well in presenting the stimulus for problem-solving, thereby introducing group discussion. However, there are situations such as guiding thinking or assessing performance which may be done more readily through verbal means, either oral or written.

Slides and filmstrips have been found to be particularly effective in situations which call for self-pacing and student participation.[14] It has also been shown that in a subject which calls for clear presentation of lines and diagrams, transparencies are more effective than chalkboard sketches.[15] Pictorial materials also have an advantage over three-dimensional objects in that they are capable of enlargement, making it possible to present details which otherwise could not be shown.

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[14] W. H. Allen, "Research on New Educational Media: Summary and Problems," A. V. Communication Review, 1959, VII (2), 83-96, cited in Briggs, Instructional Media, p. 129.

[15] C. W. Chance, "Experimentation in the Adaptation of the Overhead Projector Utilizing 200 Transparencies, and 800 Overlays in Teaching Engineering Descriptive Geometry Corridla," The University of Texas, 1960. Abstracted in AV Communication Review, 1961, IX (4), A 17-A18, (Title VII, Research Abstracts and Analytical Review, Installment) as cited in Briggs, Instructional Media, p. 129.

In his review of the literature, Allen cites a need for more comprehensive research on the educational value of pictorial illustrations, including the identification of the kinds of content best communicated by still pictures and the evaluation of the various means for implementing their use.[16] The need for definitive findings still exists.

d) Audio materials, including tapes, records, and even radio, reproduce verbal material which may originally have been either written or spoken, as well as other sound-based material. These media may be used in place of oral communication for many functions, subject to the same limitations as oral communication. Tapes and recordings are useful in presenting audio-stimuli which might not otherwise be available, such as recordings and tapes of music and lectures or speeches. It has been shown that when taped lectures followed by discussion groups were compared with conventional lectures, no significant differences in achievement were found.[17]

Tapes have the added advantages of being repeatable, so that the material may be presented in exactly the same way for all students, and of providing the repetition needed for learning chains, verbal associates, and multiple discriminations. As such, tapes have often been incorporated in language labs, although there is little clear-cut evidence that the tapes are superior to conventional methods.[18]

The use of tape recorders which would enable the student to respond to questions and then record his responses would enhance the use of tapes as a means of assessment, as well as increase their value as feedback devices. However, tapes would seem to be less effective than oral communication in guiding thinking and inducing transfer, due to lack of two-way communication. Nevertheless, there is a great deal of room for research in the use of tapes in education.

e) All education is audio-visual in the sense that sound and visual stimuli are being responded to in a meaningful way by the student. Here, however, audio-visual refers to those mechanical means of presentation which make an effort to combine sound and visual materials in a coherent fashion. Included in this category are films, television and video tapes, as well as combinations of other audio and visual media. Ideally, then, one should be able to capitalize on the advantages these two forms offer.

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[16] W. H. Allen, "Audio-Visual Communication Research," in Harris (ed.), Encyclopedia of Educational Research, (3rd ed.), Macmillan, New York, 1960.

[17] W. J. Popham, "Tape Recorded Lectures on the College Classroom," A. V. Communication Review, IX (2), 1961, pp. 109-118, as cited in Briggs, Instructional Media, p. 133.

[18] J. B. Corrall, "Research on Teaching Foreign Languages," in N. L. Gage (ed.), Handbook of Research on Teaching, Rand McNally and Company, Chicago, 1963.

Although films and television present unique advantages and disadvantages in terms of logistics of operation and preparation, Lumsdaine and May conclude that "film and TV can be considered substantially identical media for many purposes."[19]

Both films and television can present events, rather than merely objects, and also sequences of events. Thus, they are excellent for the presentation of the stimulus situation, not only by bringing in outside material, but by showing relationships between events and objects not otherwise displayed. Films and television serve particularly well in presenting problems to be solved through class discussion.

Through the use of sound tracks and superimposed devices such as arrows and pointers, films and video tapes serve the functions of directing attention, providing a model for the terminal performance, and of providing external prompts and cues (as in learning a complex motor skill). By introducing questions into the text which the student must answer while viewing the film, it may be used to direct thinking, provide feedback to the learner in regard to his responses, and even to assess learning attainments in a limited way.

Particularly with films, one must beware of "Hollywood" techniques which do not enhance the learning value of the film. Also, one should not be afraid to cut or edit commercially prepared films, when, for example, only 10 minutes of a 50-minute film is sufficient for the given purpose. Films, as opposed to television presentations, have the presumed advantages of color, a larger viewing surface and of being more easily repeated. Through the use of animation and techniques such as magnification and time-lapse photography, films may also present events or content which could not easily be presented through video tapes.

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[19] A. A. Lumsdaine and M. A. May, "Mass Communication and Educational Media," Annual Review of Psychology, XVI, 1965, pp. 475-534, as cited in Briggs, Instructional Media, p. 109.

Television, on the other hand, has the advantages of simultaneity (when broadcast live) and of being viewed in a lighter room, making note-taking easier for the students. Television and video tapes, as conceived by WETEP planners, will most often be used to present real classroom situations to students not yet in the field, rather than specially prepared television lessons as in a televised elementary science course. Such presentation may be done live, using closed-circuit TV and perhaps two-way communication channels, or through video tapes. With the advent of color, computer-retrieved video tape banks, and the ease with which such tapes may be made, the question of how best to photograph and present the content will determine whether one uses films or television.

A review of the literature by Hoban shows that: 1) people do learn from films; 2) learning from films varies in amount with audience characteristics such as age and formal education; and 3) the amount of learning can be increased by the use of redundancy, participation, and attention-getting devices and methods.[20] Much research, particularly by May and Lumsdaine, has been done to confirm the effectiveness of film in relation to comparative effectiveness of the media, utilization, and basic research. However, the rarity of filmed and television presentations which fully exploit these findings, and the potentialities of the media calls for the careful planning and production of films for use in WETEP.

f) Programmed instruction materials are not new, but it is only in recent years that they have been widely used. In this category are programmed texts and teaching machines, either automatic or manually operated, which present material in single steps or frames, including, where appropriate, questions to which the learner must respond, followed by feedback as to the correctness of the response. Programmed instruction is in effect a combination of printed media and still pictures presented in a sequence determined by consideration of the hierarchies of learnings and principles as discussed above.

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[20] C. F. Hoban, "The Usable Residue of Educational Film Research," W. Schram (ed.), New Teaching Aids for the American Classroom, Institute for Communication Research, Stanford, 1960, pp. 95-115, as cited in E. R. Hilgard, Theories of Learning, (3rd ed.), Appleton-Century-Crofts, New York, 1966, pp. 550-551.

Programmed instruction offers several advantages, the most important of which is the individualization of instruction. The learner begins instruction in accordance with the level of his prior knowledge and is then able to proceed at his own pace in mastering the material. Also, programs may be either linear or branched programs providing for even more attention to individual differences in the learner. And finally, because of the nature of sequencing the programmed materials, they are based on a sound analysis of the material to be learned.

Because programmed materials are based primarily on still pictures and printed text, they can adequately fulfill most functions of the instructional sequence: presenting stimuli, directing attention, providing modes of performance, furnishing cues, and guiding thinking. By recording the learner's answers to questions one may assess attainment, provide feedback to the learner's progress, and maintain a permanent record of that progress. To a limited degree, programmed materials may even foster transfer of knowledge by presenting problems which require the application of previously learned principles.

The literature on programmed instruction is abundant and continues to grow daily. In a review of the literature, Schramm stated that students do learn from programmed instruction, but that more information is needed to determine precisely how they learn. Topics which are being investigated include sequencing, knowledge of correct response, prompting versus confirmation, response modes, hardware versus software, pacing, and step size.[21]

g) Computer-assisted instruction (CAI) is essentially programmed instruction presented under computer control.[22] As a teaching device, CAI is able to fulfill all functions in the instructional situation as outlined above and has several other advantages. In addition to increasing the individualization of instruction, the computer:

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[21] W. S. Schramm, Research on Programmed Instruction: An Annotated Bibliography, U. S. Government Printing Office, Washington, D. C., 1964 as cited in Briggs, Instructional Media, p. 116.

[22] For a discussion of other roles the computer will play in WETEP see C. D. Sullivan, et al., "The WETEP Media and Telecommunication System," WETEP, Vol. I: Position Papers.

- carefully controls the learning sequence of each student, requiring the student to comprehend each frame;
- can judge constructed responses for accuracy;
- may offer a more stimulating learning situation than is sometimes provided by programmed texts;
- can utilize background information on each student for construction of personalized learning sequences and for judging responses.
- is more versatile than the programmed text;
- can make optimum use of the guided discovery approach to learning;
- offers data on the entire learning session as well as summary information, permitting controlled revision of the program as well as providing research data.
- is a long range investment which may be used for a variety of purposes, such as data-processing.[23]

Zinn, in reviewing computer technology research, finds that students do learn from CAI, but further work is needed in such areas as the role of the live teacher or "monitor," response processing and feedback, sequencing and selection rules, and computer-generated instructional programs.[24]

Zinn suggests that the justification for expensive, on-line computer systems today rests not on instruction accomplished but on the benefits of research materials development. For example, the use of CAI in testing hypotheses about instruction will help bridge the gap between contrived laboratory situations and actual application of learning principles in the classroom. Materials developed through the use of CAI may be duplicated in booklet form and used widely in a non-computer setting.

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[23] Walker Dick, "The Development and Current Status of Computer-Based Instruction," American Educational Research Journal, II, January 1965, pp. 41-54, in Riedesel and Suydam, "Computer-Assisted Instruction: Implications for Teacher Education," Arithmetic Teacher, January, 1967, p. 25.

[24] Karl L. Zinn, "Computer Technology for Teaching and Research on Instruction," Review of Educational Research, Vol. 37 (5), December, 1967, pp. 618-634.

As CAI becomes more widespread, several problems or questions must be answered in order to guarantee maximum effectiveness. Some of these questions have been raised by Riedesel and Suydam:

1. What will student reaction be to long-term study by CAI, as compared to a single course?

2. How quickly and easily can the technological problems associated with CAI be eliminated or controlled?

3. Can methods be designed for efficient writing and development of programs, permitting more rapid adaptation of material to the CAI format?

4. What will be the cost of widespread use of CAI and is it justified?

5. Is the computer psychologically damaging to some students, and if so, can this be overcome?[25]

The answers to these questions and others will be among the benefits derived from the use of CAI in WETEP.

Most of the basic knowledge required of the WETEP student, and the assessment of that knowledge, will be accomplished through the use of individually presented lessons using a combination of the computer with other technological aids. These will be received at Teletype-Audio-Visual (TAV) Terminals with "monitors" or teaching assistants present to answer any questions raised by the student.[26]

3) Field experiences. In WETEP are those which take place outside the WETEP classroom setting and, depending on the activity, may fulfill any of the functions of the instructional situation, particularly those of presenting stimuli, inducing transfer of knowledge, assessing attainment, and providing feedback.

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[25] C. Alan Riedesel and Marilyn N. Suydam, "Computer-Assisted Instruction: Implications for Teacher Education," Arithmetic Teacher, January, 1967, pp. 28-29.

[26] For a description of the TAV Terminal see Sullivan, et. al., "The WETEP Telecommunication System," WETEP, Vol. I, Position Papers, pp. 95-102.

a) Classroom observations include those experiences in which the student is in an actual elementary classroom setting, but not involved in teaching. Depending on the purpose, the student may be recording observations of the teacher, the children, or both. Such observations serve primarily as stimuli for further learning experiences and as the basis for future discussion involving the transfer of knowledge.

b) Field study is provided for extensively in WETEP. For example, those specializing in the Culturally Diverse Element live for one week with an Indian, Afro-American, or white family in order to study human ecology in the basic environment of the child. This is primarily a stimulus situation, providing the basis for future discussion.

c) Clinical experiences include those activities in which the student participates in the elementary classroom as a teacher. Early in the WETEP program this may involve teaching only one or two lessons. The WETEP sequence culminates in internship, in which the student is a member of a team consisting of both interns and master teachers. The intern assumes responsibility is shared by the schools and WETEP personnel. This experience allows the intern to apply directly that knowledge which he has acquired in the WETEP program. Through a remote telecommunications unit, the student has immediate access both to personnel and to materials, for help in assessment of his teaching and in reviewing specific areas of past instruction.

4) Other modes of instruction, such as independent study, include those activities on the part of the student which do not fall within another media category.

a) Independent study might include, for example, the thinking and organizing which a student does prior to presentation of a seminar paper or a discussion.

b) Also included here are laboratory experiences in which the student actively participates in the practice and application, as well as the acquisition of knowledge. These experiences may range from practicing the piano in a music lab to doing experiments in a science lab to practicing movement in a physical education class. These other modes of instruction may or may not include combinations of all of the other media.

The use of these media can be illustrated in a series of lessons dealing with the identification and writing of instructional objectives in terms of the principles established by Bloom and Gagne. The initial introduction to the concepts involved would be done through a computer-based program involving printed materials. The program would present definitions and examples, as well as opportunities for the student to check his progress through multiple-choice questions. The responses would be recorded, confirmed, or corrected by the computer. Additional practice in identification of objectives would be given through live observations and through the presentation of a video tape or film which would illustrate the objectives and types of learning found in the classroom.

Programmed instruction in writing objectives would then be provided via the computer. The student would be able to construct objectives which would be computer-analyzed and either accepted or corrected.

After these sessions, seminars would be held in which the concepts would be discussed, and further application of this knowledge would be stressed. Conferences between the students and professor would be held at several points to discuss the student's progress and suggest other modes of review and practice, if necessary. Terminal evaluation at the end of the series would be done through a written exam and a conference.

In order to summarize the functions and effectiveness of the various instructional media, Table I has been prepared based on Gagne and the WETEP Position Paper, previously cited, "The Media and Telecommunication System." The terms, yes, and no refer to those functions for which the effectiveness or ineffectiveness of the medium has been clearly shown. The term, limited, is used to imply that the medium can be used to fulfill that function, but only in a restricted way or in a limited range of content.

Benefits Derived From the Analysis of Learning Principles, Instructional Objectives, and Media Use

This paper has provided a framework for an analysis of the relationship between learning principles and choice of instructional modes. The benefits derived from this analysis may be categorized into two broad areas, primary and secondary.

Primary Benefits

Learning efficiency will be improved through the selection and use of appropriate media. Where given media prove ineffective or

TABLE I

INSTRUCTIONAL FUNCTIONS OF VARIOUS MEDIA

Medium of Instruction	Oral Communication	Conferences	Seminars	Large groups	Lab-Clinical Experiences	Printed Materials	Three-dimensional materials	Visual (slides pictures etc.)	Audio (Tapes records)	Audio-Visual (Films TV)	Programmed Instructional Materials	Computer-Assisted Instruction	Field Experiences
Presenting the Stimulus	Limited	Limited	Limited	Limited	Yes	Limited	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Directing Attention and Other Learner Activity	Yes	Limited	Limited	Limited	Limited	Yes	No	Limited	Yes	Yes	Yes	Yes	Limited
Providing Model of Expected Performance	Yes	Limited	Limited	Limited	Yes	Yes	Limited	Yes	Yes	Yes	Yes	Yes	Yes
Furnishing External Prompts	Yes	Limited	Limited	Limited	Limited	Yes	Limited	Yes	Yes	Yes	Yes	Yes	Limited
Guiding Thinking	Yes	Limited	Yes	Limited	Limited	Yes	No	No	Limited	Yes	Yes	Yes	Limited
Inducing Transfer	Yes	Limited	Yes	Limited	Yes	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Yes
Assessing Attainments	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Providing Feedback	Yes	Yes	Yes	No	Yes	Yes	Limited	Limited	Yes	Yes	Yes	Yes	Yes

limited in bringing about desired cognitive or affective behaviors, they may be revised or changed. Therefore, the proper utilization of media based on a full analysis of the benefits to be derived from the use of each type will result in the most efficient use of the student's time.

It should be added that in all cases alternative modes of instruction will be constantly evaluated. Briggs points out (as does Gagne) that "one does not hope to find evidence for matching a medium with a person or subject matter area, instead one seeks to consider learner characteristics while analyzing tasks with respect to the optimum kind of stimuli and learning conditions which can be provided by various media."[27]

There is currently no information available to enable a teacher education staff responsible for a program to make intelligent decisions about appropriate learning media on other than global criteria that are often based more on intuition than empirical evidence regarding relative success. Consequently the WETEP staff is not presently in a position to specify or document increased learning efficiency deriving from specific media. The efficiency of learning, for which there is no standard in the current programs, projected at this point is based almost entirely upon logical criteria. WETEP will add empirical support to this criteria.

Secondary Benefits

Secondary benefits of an analysis of learning principles involved in a teacher education program relate largely to the research potentials for increasing understanding of the relationship between kinds of media and their effectiveness in achieving specific kinds of educational objectives.

One of the benefits to be derived from WETEP is the provision of a center through which much of this research may be done.[28] Presented below are a number of topics and problems which are suggestive of the types of related research which can be undertaken within WETEP.

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[27] Leslie J. Briggs, "Learner Variables and Educational Media" Review of Educational Research, Vol. XXXVIII, (2), April, 1968, p. 172.

[28] M. Vere DeVault and John M. Kean, "WETEP as a Research Facility," WETEP, Vol. I: Position Papers, pp. 103-107.

Efforts to empirically determine the utility and validity of the hierarchies of learning (Gagne) and transfer of knowledge (Bloom) as presented in this paper will be among the areas to be explored. The organization of the content in the elements is particularly well suited to empirical determination of the hierarchies of principles involved both within and between elements. One basic research function of the entire media and learning principle area of WETEP is the investigation of the usefulness of the various media for the various types of learning specified earlier. It will then be possible to provide empirical evidence for each of the functions listed in Table I.

Further research in learning, related to theory building and testing, is also possible in WETEP. By using information accumulated by the computer as well as other data gathering techniques, the following learning variables can be controlled and tested:

- extinction patterns
- retention and forgetting of material
- massed versus spaced distribution of practice
- type and distribution of reinforcement
- amount and distribution of repetition
- distinctiveness of discrimination stimuli
- meaningfulness of learning tasks as related to time required for learning and amoung of forgetting
- generalization effects

Results of these and other studies can be easily applied to research in the fields of programmed instruction and CAI. By controlling and modifying the instructional programs used in WETEP, the following variables can be investigated:

- sequencing of material according to type of learning and placement in a series of principles
- the effect of knowledge of correct response on future performance
- the amount and distribution of prompting
- response modes (e.g., covert versus overt)
- hardware versus software
- pacing of the program as related to individual differences
- step-size in regard to amount of material to be presented at one time
- use of repetition

Other areas of interest related to CAI deal with the solution of any problems associated with the system and cost-benefit effectiveness of CAI as compared to other modes of instruction. Research concerning psychological reactions of students to CAI, both in initial contact and long-term effects, must also be done in determining the role of the live teacher or "monitor" in this mode of instruction.

Due to the large number of media being used, WETEP will be able to carry out much needed research in this area. By providing numerous ways to fulfill specific objectives, investigators will be able to either evaluate the relative effectiveness of each of several media or determine the effectiveness of various multi-media packages. These evaluations can be carried out with regard to such variables as the content area, the type of learning involved, and the function the media fulfill in the instructional situation, as well as convenience and cost-benefit effectiveness of the media. Of particular interest will be determination of the effectiveness of CAI as compared to seminars and group discussion techniques.

In order to make optimum provision for individual differences in terms of cognitive style and learning ability, assessment will be made of the various options offered to the student in the WETEP program. The optimum number and variety of alternatives will be determined for the choice and order of content, both within and between elements and the choice of mode of presentation of material. Research regarding the reduction or elimination of particular events in the various elements due to lack of student selection will be of particular interest.

Design and development of instructional materials will be a major project undertaken by WETEP. This would include development of computer-generated programming techniques in order to adapt material more efficiently to the CAI format, as well as computer-generated revisions of programs based on data gathered through use of the program.

Conclusion

To help the students make the best use of their time in accomplishing the instructional objectives of WETEP, considerable attention is given to measuring the effectiveness of all components of the system. One major phase of this evaluation is a description and analysis of the relationship between the various media and learning principles. Kinds of learning, applications of learning theories, and the benefits expected from a variety of media uses within the WETEP program have been discussed. Participation in this kind of investigation is undertaken to deepen understanding and to confirm information about the actual benefits of specific media to specific tasks in the education of teachers.

BENEFITS OF WETEP PROGRAM
TO
TEACHER EFFECTIVENESS

Theodore Czajkowski
John M. Kean

Introduction

Teacher effectiveness is the ultimate criterion of success for any teacher education program. As a context for modeling teacher education programs, WETEP is designed to associate evaluation and research activities with the continuous selection and development of instructional alternatives. In conducting these research activities, it is anticipated that the major obstacles previously attendant to teacher effectiveness research will be partially resolved. This paper will examine briefly the background research on teacher effectiveness and will indicate specific ways in which the study of teacher education can be conducted within WETEP. Following this brief examination, benefits of research in teacher effectiveness will be delineated.

Review of Research on Teacher Effectiveness

Although much research on teacher effectiveness has been reported, the results have provided little direction useful in the improvement of instructional practice.[1] For several decades educational researchers have attempted to identify the manner in which personality variables and other characteristics are related to teacher effectiveness in the classroom. Among those variables identified with the personal dimension of the teacher were personality characteristics, personal and social adjustment factors, interests, attitudes, needs and values.[2] The efforts of David Ryans and A. S. Barr and their associates illustrate the many projects that have resulted in meager, sometimes confusing, and occasionally contradictory evidence.[3,4] Getzels and Jackson concluded:

> Despite the critical importance of the problem and a half-century of prodigious research effort, very little is known for certain about the nature and measurement of teacher personality or about the relation between teacher personality and teacher effectiveness. The regretable fact is that many of the studies so far have not produced significant results. Many others have produced only pedestrian findings.

The writers acknowledge the assistance of Richard Reinke.

[1] G. S. Kleinman, "Assessing Teaching Effectiveness: The State of the Art," Science Education, 50, April, 1966, pp. 234-8.

[2] J. W. Getzels and P. W. Jackson, "The Teacher's Personality and Characteristics," Handbook of Research on Teaching, Nathan Gage, ed., Rand McNally & Co., Chicago, 1963 pp. 506-7.

[3] David G. Ryans, "Characteristics of Teachers," American Council on Education, Washington, D. C., 1960.

[4] Arvil S. Barr, "Wisconsin Studies of the Measurement and Prediction of Teacher Effectiveness: A Summary of Investigations," Journal of Experimental Education, XXX, September, 1961, pp. 5-156.

> . . . What is needed is not research leading to the reiteration of the self-evident but to the discovery of specific and distinct features of teacher personality and of the effective teacher.[5]

However difficult the task may be, the rewards in increased educational productivity through more explicit selection and effective preparation of teacher education candidates make continued exploration worthwhile. Many of the studies of teacher effectiveness look at rather broad attributes because the teacher is expected in these studies to be all things to all people--teachers with many characteristics to teach all ages of children from varying backgrounds.

Criteria of Teacher Effectiveness

Mitzel distinguishes three criterion categories for evaluating teacher education criteria: presage criteria, process criteria, and product criteria.[6] These categories parallel the input, operations, and output components of WETEP. Flanders, in organizing his review of research on teacher effectiveness gives the following examples.[7] "Warmth toward pupils" is a characteristic present and measureable in a person prior to teaching and hence a presage variable. The corresponding process variable is a measure of warm behavioral acts while teaching. The product variable is a learning outcome associated with or resulting from teacher warmth.

Presage Criteria. Until very recently, the focal point of most research has been the prediction of teacher success, a type of presage criterion of special interest to those working in teacher education programs. The research done on presage criteria, though extensive, can be collectively described as having brought forth no clear conclusions.

Personality characteristics were seen as particularly difficult to define, the principal categories for theories of personality being 1) behavioral, 2) social-stimulus, and 3) depth.[8] But the research reviewed usually failed to make clear the concept of personality which gave direction to the research, and usually failed to make explicit the theoretical framework (if any) for the research.

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[5] Getzels and Jackson, op. cit., p. 574.

[6] Harold E. Mitzel, "Teacher Effectiveness," Encyclopedia of Educational Research, 3rd Ed., Chester Harris, ed., Macmillan Co., New York, 1960, pp. 1481-6.

[7] N.A. Flanders, "Teacher Effectiveness," in Encyclopedia of Educational Research, 4th Ed., Robert Ebel, ed., Macmillan Co., New York, 1969, pp. 1423-1437.

[8] Getzels and Jackson, op. cit., p. 574.

The instruments used in personality research usually of the pencil-and-paper variety, were rarely selected with appropriate fundamental questions in mind. Rather, seemingly random approaches were usually employed--"Say, here's a new personality test; let's try it out on teachers," was the rule, rather than the selection or development of tests appropriate for a specific theory of teaching, of learning, or of the relation of identified teacher characteristics to either.[9] Even when characteristics were identified, their validity as standards for judging teacher effectiveness is doubtful.

Prediction of teacher success on the basis of academic records has also been shown by researchers to be a dubious method of measuring teacher effectiveness. Cornett reveals that neither grades in introductory education courses nor grades in second-semester freshman composition nor even over-all grade point average correlates significantly with success in teaching.[10] The only recent research that indicated a correlation between prediction and performance was reported by Pigge.[11] He concluded that elementary principals did rate former college students who had cumulative "A" GPA's significantly higher than they did the teachers who made "C" grades during their college years. Even with these findings, one questions their relevance to the problem of ascertaining criteria for teacher effectiveness. One wonders what components of the "A" student's grade point account for his success. A letter grade encompasses many variables--none of which are identified by Pigge.

Process Criteria. The process criteria are the focal point of research on teacher effectiveness that hold the most promise. Kleinman points out that measurement of classroom behavior by observation appears to be the best means by which teacher competence can be evaluated.[12] As an example, Soar praises Flanders' system of interaction analysis both because its method is objective and because its relevance has been validated in terms of pupil growth.[13]

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[9] Getzels and Jackson, op. cit., p. 575

[10] J.D. Cornett, "Effectiveness of Three Selective Admissions Criteria in Predicting Performance of First-year Teachers," Journal of Educational Research, 62, Feb., 1969, pp. 247-50.

[11] F.L. Pigge, "Teaching Effectiveness of A and C Elementary Teachers," Journal of Educational Research, 62, November, 1968, pp. 99-102.

[12] Kleinman, op. cit., pp.234-8.

[13] R.S. Soar, "New Developments in Effective Teaching," American Biology Teacher, Inc.

Getzels and Jackson identify experimental limitations as a set of further obstacles to successful research.[14] Most studies treat teachers as a monolithic group without regard to the individual nature of teachers studied or the specific environment in which they taught. For example, teachers studied in an urban environment and found to be effective many have been considerable less so in a rural environment, and so on. Teachers viewed from many different teaching situations were too often treated as similar even though a teacher effective in a tutoring situation may well be ineffective in a lecture situation.

The solution which Getzels and Jackson saw for the difficulties attendant on research into teacher personality, characteristics, and effectiveness was the development of a more sophisticated body of theory to form the framework for research studies.[15] What they did not consider, however, was that the experimental limitations which they saw did not preclude the development and testing of theories significantly different from studies which had already been done. The whole pencil-and-paper psychological-testing-inspired approach to teacher effectiveness may be incapable of surmounting the experimental limitations which Getzels and Jackson describe. Certainly we have no reason to believe that their call for a new theoretical approach will be successfully answered in the context of the same research methods which have been explored thoroughly for several decades.

The criterion for effectiveness, or the criterion for the characteristics assessment were seen to be obviously crucial by Getzels and Jackson. As they put it, "What are we selecting for and predicting to? How does one define the effective teacher in some distinctive and characteristic way?"[16] Since whatever testing instruments were devised would have to be calibrated with reference to some criterion, the selection of that criterion is of considerable importance. But ratings of teachers, whether by pupils, experimenters, other teachers, supervisors, or adminstrators seem to have been basically unreliable. Teachers, students, and supervisors differed on just who was and what made a good teacher. Ratings failed to take into account any of the difficulties in defining teacher effectiveness.

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[14] Getzels and Jackson, op. cit., p. 575.

[15] Getzels and Jackson, op. cit., pp. 575-6.

[16] Getzels and Jackson, op. cit., p. 575.

Product Criteria. Product criteria, labeled "ultimate criteria" by the Committee on the Criteria of Teacher Effectiveness of the AERA, consist primarily of the teacher's effects on his pupils' achievement of educational objectives and their success in life. In short, an effective teacher is one who contributes to pupil gain or pupil growth.[17]

A serious drawback of this direct method of evaluating teacher effectiveness is the presence of contingency factors, variables which affect pupil growth but bear no relation to the teacher himself. Contingency factors are of two kinds - environmental and pupil. Pupil growth might well be influenced by the size, location, and condition of the school building or classroom in which learning is to take place. Pupil growth might also be affected by the interests, attitudes, and prejudices with which the pupil enters the classroom. Because pupil growth (or lack of it) can apparently be attributed to more factors than the teacher alone, using pupil gain as a criterion for evaluating teacher effectiveness may be hazardous for the researcher. However, in the future, with the development of more sophisticated instruments to understand the child input into the classroom, researchers will be able to build research designs that permit covariance of these variables to remove or at least minimize their effects on dependent variable measures.

Using the more "objective criterion of pupil gain," researchers were still found to be dealing with significant variables not encompassed within their theoretical framework. Getzels and Jackson called for researchers to relate the criterion". . . to some framework of school objectives and the total social and psychological context within which the child functions."[18]

WETEP Benefits for Research on Teacher Effectiveness

WETEP makes possible the development of a new context for the study of teacher effectiveness and teacher evaluation. The continuous feedback provided for in WETEP facilitates self-evaluation of teaching performance. Within its provisions for continuous research into teaching and learning, WETEP provides both the context and the theory for on-going research in teacher effectiveness, while at the same time constantly modifying theories and testing procedures as indicated by the feedback mechanisms. The flexibility of WETEP and its structure based on systems analysis offers the potential for defining and implementing research on teacher effectiveness in ways not previously possible.

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[17] N.L. Gage, "Paradigms for Research on Teaching,"Handbook of Research on Teaching, Nathan Gage, ed., Rand McNally & Co., Chicago, 1963, pp. 117-8.

[18] Getzels and Jackson, op. cit., p. 575.

WETEP will research teacher effectiveness in a dynamic context which permits the establishment and continuous reshaping of criteria and instructional devices. This dynamic context will enable the staff to help teachers continuously examine their own attitudes, values, and functional skills. Future teachers will examine their attitudes toward teaching and toward children and will work to improve these attitudes. There is research to support the idea that changes in perception of these attitudes can be fostered from beginning to end of the pre-service education.[19]

It is hypothesized in WETEP that criteria for teacher effectiveness can best be realized by combining methods of classroom observation and of microteaching and videotaped feedback with consideration of the teacher's awareness of the rationale for his behavior which can be measured in simulated or other laboratory situations.

There are other indications in recent research that also provide support for directly attempting to monitor teacher behavior. For example, Flander's in his review of research on teacher effectiveness says, "With fairly high confidence it can now be stated that the percentage of teacher statements that make use of ideas and opinions previously expressed by pupils is directly related to average class scores on attitude scales of teacher attractiveness, liking the class, etc., as well as to average achievement scored adjusted for initial ability."[20] Accepting this as a criterion with operational levels added enables teacher education staff to design programs using objectives related to teacher statements which make use of pupils' ideas and opinions and then to measure changes in the teacher's use of them.

WETEP is designed to provide benefits in terms of both theoretical and practical research in the area of teacher effectiveness. Such research will provide a needed stimulant for vitalizing the processes of teacher education.

Problems for Research in Teacher Effectiveness

What are significant problems in need of research in teacher effectiveness to which WETEP may be expected to contribute? Each of several major problems encountered in past teacher effectiveness research is identified and discussed in terms of the WETEP potential for contributing to its clarification.

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[19] Frances F. Fuller, ed., Robert F. Peck, Oliver H. Brown, Shirley L. Menaher, and Meda M. White, Effects of Personalized Feedback During Teacher Preparation on Teacher Personality and Teaching Behavior, R & D Report Series, No.4, Research and Development Center for Teacher Education, University of Texas, Austin, Texas, Spring, 1969.

[20] Flanders, op. cit.

The Problem of No Theoretical Framework. WETEP with its emphasis on personalized instruction, cybernetic systems, and behavioral objectives provides essential ingredients needed to establish a systematic framework for the study of teacher effectiveness. The continuous systematic longitudinal feedback from input (introductory experiences) into in-service (on-the-job) makes it possible to monitor progress specifically and frequently as individual students evolve through the process of becoming a teacher. The personalized individualization of instruction represents a significant departure from past and present teacher preparation programs. It allows the examination of individuals as they develop unique teacher roles associated with both the art and the science of teaching. Through the continual assessment of students, comprehensive personal and academic profiles can be obtained. It becomes feasible within WETEP to examine both nomothetic (generalizable) and idiographic (unique) dimensions of teacher development and the interaction between them. The behavioral objectives serve as criteria for assessing the development of competencies that are theoretically and experimentally associated with effective teaching.

WETEP provides a sophisticated framework for analyzing individual progress in relation to personal and professional aspects of teaching. Although there appears to be general agreement that teaching is a combination of art and science, there is little substantive data to help clarify how the artistic and the scientific function together or separately to promote effective teaching. WETEP provides for the careful analysis of personal characteristics and professional competencies in lab, lab-clinical, and real teaching-learning situations.

The theoretically derived assumptions and hypotheses which support the emphasis on personalized individualization of instruction within a cybernetic system and behavioral objectives will provide a continuing source of research foci. The extent to which tested theories prove to be useful and provide direction for planning WETEP and other teacher education programs or prove to be invalid and are rejected, is one measure of the benefits of WETEP for teacher education.

The Problem of Criteria. The WETEP input component involving orientation and screening elements will provide meaningful presage or predictive criteria of teacher effectiveness. Data collection on past students in teacher preparation at the University of Wisconsin and other institutions has been underway for a number of years. Data on retention rates in the profession, reasons for entering and leaving programs, and other facts are being analyzed. Personality and biographical data are being collected on students currently enrolled in teacher education at the University of Wisconsin. Such data and their implications for WETEP are reported in other project publications.

Input component variables will be studied in relation to student's progress and performance in the teaching-learning and output components to determine functional relationships between presage, process, and product criteria of effectiveness. WETEP provides the opportunity for the longitudinal study of individuals in relation to relevant forms of the three types of criteria. This is an improvement over previous research which has in most cases used subjects with different characteristics, in different preparation programs, at different levels of development, using different criteria. Attempts to integrate the results of such diverse research have been frustrating at best and offer little to the establishment and testing of hypotheses which lead to the development of useful theory.

In the development and testing of theoretical positions, WETEP research on teacher effectiveness will fully utilize and continue to refine and extend observation techniques or process criteria which have shown promise in past research. Interaction analysis techniques developed by Flanders,[21] and Hough and Amidon;[22] observation systems formulated and researched by Bellack, Kliebard, and others;[23] and other interaction studies done by Gallagher and Aschner,[24] Smith, [25] Withal and Lewis,[26] May and DeVault,[27] represent some of these preliminary reports. Objective measures of the quantity and patterning of classroom interaction are quite well developed. Much less is known about objectively describing the quality of teacher behaviors involved in various forms of classroom interaction. One emphasis of WETEP research will be to develop useful theories about analyses of teacher behaviors and attempt to relate them to other criteria of teacher effectiveness.

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[21] Ned A. Flanders, Teacher Influence, Pupil Attitudes and Achievement Monograph, No. 12. USOE, CRP 29.7 University of Minnesota, 1961, p. 126.

[22] John B. Hough and Edmund J. Amidon, "Behavioral Change in Pre-service Teacher Preparation: An Experimental Study," College of Education, Temple University, 1964.

[23] Arno A. Bellack, Herbert M. Kleibard, Ronald T. Hyman, and Frank L. Smith, Jr., The Language of the Classroom, Teachers College Press, New York,p. 274.

[24] James J. Gallagher and Mary Jane Aschner, "A Preliminary Report on Analyses of Classroom Interaction", Merrill-Palmer Q., 1963,pp.183-94.

[25] B.O. Smith and others, "A Tentative Report on the Strategies of Teaching,"Bureau of Educational Research, University of Illinois, 1964, p. 103.

[26] John Withal and W.W. Lewis, "Social Interaction in the Classroom," Handbook of Research on Teaching, N.L. Gage, ed., Rand McNally and Company, Chicago, 1963, pp. 683-714.

[27] Frank B. May and M. Vere DeVault, "Hypothetical Dimensions of Teachers' Communication," American Educational Research Journal, Vol. 4, No. 3, May, 1967, pp. 271-8.

The Teaching Strategies Module which identifies constituents of teaching behavior is illustrated in the Curriculum and Instruction Element.[28] The behaviors that correspond to each constituent provide promising foci for microteaching experiences and specific analysis of teaching behaviors. The identification of these microcriteria (to use Gage's term discussed earlier) allows much more explicit study of smaller bits of teaching behavior which Gage has supported as the most fruitful course for future research. The search for global criteria has been all but abandoned because of its failure to produce meaningful results.

The microcriteria identified and classified in the curriculum and instruction element can be examined through the use of videotaped microteaching episodes. WETEP studies on teacher effectiveness will continue to explore techniques of microteaching that have been pioneered at Stanford University.[29] The constituents of teaching behavior already identified in the WETEP proposal provide an exciting avenue for conducting such research. Longitudinal studies comparing individual students' video performances in several specific teaching-learning situations should furnish valuable information on professional growth patterns.

The relationship between WETEP and the cooperating school districts establishes the basis for obtaining more valid and reliable product criteria. A mutual commitment to the individualization of instruction for both teacher preparation students and elementary youngsters is at the root of the WETEP model. Cooperating schools and the University of Wisconsin mutually develop individualized curricula, and attempt to more effectively diagnose and continually assess individual progress of students. Since they will share computer and media facilities, it is probable that improved measurements and storage of pupil achievement and growth can be accomplished. As was previously mentioned, this represents the ultimate criterion of teacher effectiveness. More reliable and valid measurement of pupil achievement and growth criteria related to specific educational experiences and teacher behaviors would represent a very significant development in teacher effectiveness research. The implementation of WETEP will enable the University and cooperating schools to actively pursue research in this area.

The Problem of Treating Teachers as a Generalized Group. Earlier statements have focused on individualized instruction in WETEP. Obviously neither WETEP students nor research on their ability to perform effectively as teachers will be treated in a generalized manner.

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[28] Carl Personke, Theodore J. Czajkowski, Kenneth R. Howey, and Donald N. Lange, "Curriculum and Instruction," WETEP, Vol. III: Element Specifications, University of Wisconsin, Madison, Wisconsin, 1966,pp.5-31.

[29] Dwight Allen and Kevin Ryan, Microteaching, Addison, Wesley Publishing Company, Reading, Mass., 1969, p. 151.

Earlier research supports the assumption that one teacher probably performs some teaching behaviors effectively and other ineffectively. We have long recognized individual differences in youngsters, and it is important that we begin to fully recognize that teachers, too, have individual differences. There are many different roles that can be performed by instructional personnel in the formal educational process. The competencies required to perform these different roles are not necessarily compatible with the characteristics of a single person.

WETEP Approaches to Problems of Research in Teacher Effectiveness

WETEP has recognized individual differences in teachers by individualizing instruction, by developing various forms and levels of specialization, and by preparing teachers for team teaching. The underlying hypothesis is that a team of teachers utilizing their specialized personal and professional competencies can better provide meaningful and productive educational experiences for a group of youngsters than can a single teacher in a self-contained classroom.

Current methods of looking at teacher effectiveness may be dysfunctional in terms of determining the effectiveness of teachers in WETEP teams. WETEP clinical experiences faculty are working with the University of Wisconsin Research and Development Center for Cognitive Learning, the Wisconsin State Department of Public Instruction, and other institutions of higher learning in Wisconsin, to explore and extend concepts associated with team teaching and teacher role differentiation. A prototypic institute for preparing team leaders and differentiating teacher roles was funded by EPDA and conducted by WETEP clinical experiences faculty in the summer of 1969 on the Madison Campus. Many of the participants were teachers from WETEP cooperating school districts. Institute developments and subsequent follow-up research should provide valuable information for assessing teacher performance in teaching teams.

The current movement toward team teaching and differentiated teacher roles has implications for WETEP teacher effectiveness research. Roles performed by teachers will tend to be many and varied. Teacher effectiveness certainly can no longer be assessed in terms of global criteria and can be determined by relating to an individual teacher's ability to perform a specifically defined instructional role. The explicitness of such research is encouraging when compared to global measures attempted in prior studies.

Other Research Areas

Several factors and areas identified by Yee,[30] by DeVault and Kean,[31] and by Barrett [32] also provide benefits to more effective teaching by increasing and restructuring the parameters within which knowledge about teacher effectiveness is gained. Each area is briefly discussed and some possible research questions are identified in the following sections.

Individualized Instruction. Because the emphasis on the individualization of instruction is a foundational basis for the WETEP model, it represents a significant departure from most if not all teacher preparation programs and thus affords the opportunity to research previously unresearchable questions.

1. Does an individually prescribed teacher education program produce teachers who differ from those prepared in programs where experiences are basically similar and ordered for all students?
2. How do WETEP teachers differ from other teachers in terms of process (e.g., classroom interaction) and product (e.g., pupil achievement) variables.
3. Are WETEP teachers more likely to individualize instruction for their pupils than teachers who are prepared in programs that afford little individualization of instruction?
4. In what ways do WETEP teachers differ from each other based on different sequences of educational experience?
5. In what ways do WETEP teachers differ from each other based on different time spans spent in various preparation experiences?
6. In what ways do WETEP teachers differ from each other based on choices opted in their individualized preparation programs?

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[30] Albert H. Yee, "A Cybernetic System for WETEP: A Model Design for the Preparation of Teachers," WETEP, Vol. I: Position Papers.

[31] M. Vere DeVault and John M. Kean, "WETEP as a Research Facility," WETEP, Vol. I: Position Papers.

[32] Thomas C. Barrett, "Research Potential and Benefits of WETEP, WETEP Feasibility Study, Vol. V: Program and Support Systems.

Systems Approach to Instruction. The WETEP model provides a consistent schematic hierarchical framework which offers the opportunity for establishing a theoretical framework which has been lacking in past research. Far better personal and academic profiles can be obtained during WETEP operation than have been secured in past research. This should allow careful differentiation of personal and academic variables for study.

One of the weaknesses of past research on teacher effectiveness has been that segments of pre-service and in-service development have been studied in isolation. In trying to piece together the results of such studies, one has difficulty seeing the effects of varying preparation experiences, or such variables as environmental differences on teacher effectiveness over time. Research on different teachers in different situations at different levels of development working with different youngsters is very difficult to collate and generalize from usefully. The opportunity for systematic, longitudinal study of students becoming teachers offers one of the most promising benefits of WETEP research on teacher effectiveness. Among the many specific questions which remain to be researched are:

1. Do students with particular personal profiles operate more effectively in specific kinds of teaching-learning situations than students with different personal profiles?

2. Do patterns of development evidenced by observations of individual students over time provide better predictive data relating to teaching effectiveness than other single or multiple predictors that have shown some predictive validity in past research?

3. Do students with particular academic profiles based on continual assessment operate more effectively in specific kinds of teaching-learning situations?

4. Do students with certain personal and academic characteristics teach more effectively in certain situations than in others? (Different schools, communities, youngsters)

Summary

It is clear that research on teacher effectiveness has offered little substantive evidence to guide efforts to better screen, prepare, and evaluate teachers. The implementation of WETEP would allow a much more systematic, longitudinal research effort than has been achieved previously. WETEP provides an operational model for preparing more effective teachers for the schools of today and tomorrow. It combines successful elements of on-going teacher preparation with feasible, innovative elements still in the frontier stages of development. The teacher effectiveness research conducted within the WETEP framework will embody the same two elements in a research context.

WETEP intends not only to achieve better identification of the components of effective teaching but also to identify the most appropriate experiences for preparing more effective teachers. These mutually compatible efforts will be facilitated by feedback and regeneration which is built into the cybernetic system and the opportunity to continually and systematically assess individual progress from input through in-service levels.

BENEFITS OF THE WETEP PROGRAM TO RETENTION OF STUDENTS

Dan W. Anderson
R. Christian Johnson
John M. Kean

178/179/180

Introduction

National Education Association studies indicate that roughly one-third of all college graduates in the United States complete certification requirements for teaching in elementary or secondary schools. Of that one-third, about half accept teaching jobs, and only half of those are still teaching five years later. These figures present not only an indication of the popularity of the teaching profession but also the stark reality as to its holding power. Of additional concern are the retention rates within teacher preparation programs. Even before the student completes his qualifications for the teaching certificate, there is the possibility that he will depart from his original career choice. National statistics for attrition rates in teacher education programs are unavailable, and, though not as dramatic as the post-graduation rates, they still represent a major problem.

It should be hastily added that attrition is not necessarily bad. Not every student who enters a teacher education program will find himself ideally suited for it. The program that does not "lose" a certain number of its candidates would have to possess either absolute control of its students or a perfect initial screening process. And we know from reviews of various studies that there is little evidence of exceptionally good screening procedures and even less evidence of quality control procedures within teacher education programs. The point remains to encourage those individuals who show pedagogical potential and to discourage those who do not possess this potential.

Current manpower management in education programs is not directed to student retention. Since the loss of students is undoubtedly a relatively costly problem, WETEP management and guidance personnel will be devoted to the analysis of data which will help measure WETEP student retention. If WETEP research measures understanding of the conditions which cause students to leave teacher preparation programs, changes in the program will conserve resources and also provide additional talented students for the profession.

Student retention rates are expected to be higher for WETEP than for traditional teacher education programs, due to improved screening procedures and the improved quality of WETEP. Longitudinal studies will be designed to determine the effects of preliminary screening procedures on retention rates of students who begin WETEP. These procedures should also provide data to aid in retention of the most likely candidates for successful teaching. The effectiveness of this screening will be ascertained by comparison of WETEP retention rates with present and past data.

Student Attrition in the Current Program

In order to secure base line data by which to judge the effectiveness of WETEP retention efforts, the records of students transferring out of the current elementary education program were examined. Available data were examined to provide insights into the following questions: Who transferred? When did they transfer? What was their academic standing at the time of transfer and after the transfer? How much of the elementary education program had they been exposed to? Why did they leave? While the information in this study of the existing program provides only tentative indications of the benefits which WETEP will provide, data from similar research within WETEP, when it is implemented, will be less tentative and will be used as one benefit criterion to determine the success of the program.

Population of Transfer Students. From records supplied by the Office of Student Personnel in the School of Education for the period 1962 through the first semester of the 1968-69 school year, 205 students were found to have transferred out of undergraduate elementary education and into some other classification within the university. This represents a yearly attrition rate of over six per cent. The number of transfers for the period 1962-1969 are presented in Table I.

Not all of the students who transferred in the academic year 1968-69 were included in the study. Similarly, 1962 was not typical since it was the year in which these records began. From 1963 through 1968 there seems to have been a gradual increase in the number of transfers; this can undoubtedly be attributed to the concomitant increase in the enrollment in the School of Education (Table I). Of the 205 students who changed their classification, 6.44 per cent were special summer school students, a classification given to students who would be graduating at the end of their fourth year but wished to take further courses in summer school. It is not significant for the purposes of this study that these students should change their classifications. Another 6.44 per cent transferred from elementary education into secondary education. Since their interests remained within professional education, these students are also not included in the further analysis of the records. Of the 205 transfers, 3.42 per cent went into home economics, leaving the possibility of teaching home economics or child development in the future. Two students, one per cent, transferred into each of the following classifications: music, art education, nursing, and family resources. A single student transferred into each of the following: business, commerce, pre-business, art, and occupational therapy. These students left elementary education for fields which are frequently chosen by women. (Of 205 transfer students, one was male and 204 were female.)

Seventeen students, after transferring to the College of Letters and Science, transferred back into the School of Education. The records of seven students were unavailable from the dean's office in the College of Letters and Science; these students may have transferred again into another college within the university. The remaining 134 student folders provided the data on which this study was based. Unless otherwise noted in the accompanying tables, the population for this study was 134. Where noted, it simply means the data were not available in the student folder.

TABLE I

NUMBER OF TRANSFERS
FROM ELEMENTARY EDUCATION
TO OTHER UNIVERSITY OF WISCONSIN PROGRAMS 1962-1969

Year of Transfer	Average Number of Undergraduates Enrolled in Elementary Education*	Number of Transfer Students	Per Cent Attrition
1969	---	18	---
1968	517	29	5.61
1967	515	35	6.80
1966	437	26	5.95
1965	355	23	6.47
1964	---	28	---
1963	---	36	---
1962	---	10	---
Total		205	

*These figures were obtained by averaging the end of term enrollments for the spring and fall semesters of the calendar year. Indicated figures were supplied by the Student Personnel Dean's Office of the School of Education, Summer, 1969. Figures for 1969 were not yet available. Figures for 1962-64 were unobtainable because university accounting procedures did not distinguish among education program majors prior to 1965.

Time of Transfer. The students who transferred did so primarily in their sophomore and junior years; this was not unexpected as students would have had to transfer in those years to complete a major in the College of Letters and Science in the normal period of time (Table II).

TABLE II

STUDENT STATUS AT TIME OF TRANSFER
(Population 149)

Classification	Transfer Students Number	Transfer Students Per Cent
Freshman	2	1.3
Sophomore	64	43.0
Junior	70	47.0
Senior	13	8.7
Total Transfers	149	100.0

Academic Rank of Transfers. Of the 112 students for which high school rank data were available, 54 (45.4 per cent) of these transfers ranked in the top 10 per cent of their high school graduating classes, and 82 per cent ranked above the 70th percentile. This did not appear to differ from the percentile rankings for the University as a whole (Tables III and IV).

As can be seen from Table III, 31.4 per cent of these students had taken no education courses whatever before transferring out of the School of Education. Of the 92 students who had taken some education courses, 41.4 per cent (and 29.1 per cent of the total) had not taken an introductory or orientation education course.

TABLE III

EDUCATION COURSE CONTACT

Education Course Contact	Students in Each Category	
	Number	Per Cent
Took no education courses	42	31.4
Took introductory education course	53	39.5
Took education courses but no introductory course	39	29.1

TABLE IV

HIGH SCHOOL PERCENTILE RANK DISTRIBUTION
(Students Transferring from Elementary
Education and All Entering Freshmen)*
(Population 119)

Percentiles	Elementary Education Transfers		Entering University of Wisconsin Freshmen	
	No.	Cumulative Per Cent	Women	Men and Women Combined
90-99	54	46.1	38.4	32.7
80-89	27	69.2	62.1	55.4
70-79	15	82.0	78.1	72.1
60-69	16	95.7	88.5	84.0
50-59	1	96.6	94.8	91.5
0-50	4	100.0	100.0	100.0

*These data were obtained from the University of Wisconsin Office of the Registrar, Student Statistics. All figures are given in cumulative percentages.

The difference between the figures for entering females and the students who transferred from elementary education to the College of Letters and Science (all but one being female) can be accounted for if one accepts the assumption that the college population becomes more homogeneous as students with less academic potential leave school. The gradepoint averages of the students who transferred, however, showed as many students with over 3.0 averages (on the 4.0 scale) as under the 2.5 required to stay in the School of Education (Table V).

TABLE V

GRADEPOINT DISTRIBUTION AT TIME OF TRANSFER
(All figures are given in accumulative percentages)

Gradepoint Range	Students in Range	Gradepoint Range	Students in Range	Gradepoint Range	Students in Range
3.60-4.0	4.5 (6)	2.90-2.99	37.4 (9)	2.40-2.49	82.8 (17)
3.50-3.59	5.2 (1)	2.80-2.89	44.7 (10)	2.30-2.39	89.6 (9)
3.40-3.49	9.0 (5)	2.70-2.79	53.0 (11)	2.20-2.29	91.7 (3)
3.30-3.39	12.7 (5)	2.60-2.69	62.6 (13)	2.10-2.19	94.2 (3)
3.20-3.29	14.9 (3)	2.50-2.59	70.1 (10)	2.00-2.09	96.3 (3)
3.10-3.19	22.4 (10)			0.00-1.99	100.0 (5)
3.00-3.09	30.6 (11)				
Totals	41		53		40

Reasons for Transfer. Written evidence concerning the reasons students requested transfer out of the School of Education were generally found in two places: 1.) statements of students contained in the admitting files of deans in the College of Letters and Science, and 2.) comments of the dean himself regarding his personal impressions of the student and a summary of their discussion. The data from these sources are presented and discussed below. The major areas of study of the transferred students (or their most likely major if definite majors were not listed) were overwhelmingly concentrated in five areas: English, sociology or social work, psychology, history, and languages (French, German, Spanish, Italian, and linguistics) (Table VI).

It should be noted that although all of these students were in the College of Letters and Science, not all of their interests were. For example, Art and Dance are administratively within the School of Education. It seemed very likely that the first three (English, sociology or social work, and psychology) were academic disciplines which would be likely to attract any person interested in elementary education since they are clearly related to key areas of elementary education. Those students interested in psychology were almost without exception interested in child psychology or fields in psychology related to education.

TABLE VI

INDICATED MAJOR OF STUDENTS TRANSFERRING FROM ELEMENTARY EDUCATION*

Indicated Major	Students Number	 Per Cent
English	34	23.0
Social work or Sociology	21	14.3
Psychology	21	14.3
History	16	10.8
Languages	11	7.4
French (4) Italian (1)		
Spanish (3) Linguistics (1)		
German (2)		
General humanities	7	4.8
Art history	5	3.4
Political science	5	3.4
Speech	5	3.4
Music	4	2.8
Philosophy	3	2.0
American institutions	3	2.0
Anthropology	2	1.3
Economics	2	1.3
Dance	2	1.3
Art	1	0.67
Mathematics	1	0.67
Library science	1	0.67
Biology	1	0.67
Geology	1	0.67
Geography	1	0.67
Ibero-American studies	1	0.67

*Some students indicated more than a single possibility, and these are included in the tabulation.

Table VII indicates the reasons given by students for transferring from the Elementary Education program. Of the students who transferred, 13.4 per cent declared a continuing interest in education to the College of Letters and Science dean who admitted them to that college.

TABLE VII

REASONS FOR LEAVING ELEMENTARY EDUCATION*

Comments Regarding Transfer	Students Giving Response	
	Number	Per Cent
Gave no reasons for leaving elementary education	32	23.8
Expressed dissatisfaction with elementary education courses or program	27	20.2
Showed interest in alternate field	24	17.9
Expressed continuing interest in education or in school connected jobs	18	13.4
Expressed feeling that teaching was not for them	14	10.4
Expressed a desire to return to School of Education (those who were not having grade difficulties)	8	6.0

*Some students gave more than a single reason for leaving.

Of the students who indicated a continuing interest in education, eight expressed a specific intention to return to the School of Education at some future time, most likely in the graduate intern program. Dissatisfaction with the elementary education program or courses and an interest in some other field were most commonly given as reasons for leaving education by the students who gave specific responses. Since deans' comments were recorded on student records only when they felt the information was relevant, much information and student commentary were not recorded. WETEP will clearly offer an opportunity to research this area adequately, since systematic inquiries will be made of all students leaving the program, and deans will record systematic rather than random observations.

Other Reasons for Transfer. Characteristics of transfer students recorded in deans' notes are presented in Table VIII.

TABLE VIII

CHARACTERISTICS OF TRANSFER STUDENTS FROM ADMITTING DEANS' COMMENTS

Characteristic	Transfer Students	
	Number	Per Cent
Emotional problems, indecisive, uncertain goals and motivation	35	26.1
Grade difficulties (specifically mentioned in deans' notes	27	20.2
Marriage and family reasons	16	12.0
Financial difficulties	9	6.7
Travel abroad	7	5.2
Illness	7	5.2

Again, the point must be made that these observations result from subjective statements by deans following informal discussions with the students. WETEP will be in a better position to provide for the use of standardized instruments to record these phenomena among its students. Deans' comments indicated considerable trouble with grades, even for those students with grade points above 2.5. Such evidence as incomplete work and dropping out of school without notifying anyone, accounts for some of the deans' comments in this area. Although some students were mentioned as suffering financial difficulties, problems connected with marriage and family were more frequently cited. (Note here that only those students who transferred from the School of Education to another college within the University are being considered.) Indeed, those having difficulties due to marriage might even be supposed to number financial worries among their difficulties whether or not this was actually mentioned. Some students were ill; some students wished to travel and study abroad but could not do so because of inflexibility in the existing education program; and some were what the deans described as "routine transfer".

The study resulted in one additional finding relevant to a study of retention within teacher education. Forty-four of the 134 transfers on whom data were available (32.9 per cent) had entered the University of Wisconsin from another university, liberal arts college, or junior college. This did not include those students who had transferred to the University of Wisconsin-Madison from some other campus within the university.

Discussion of Transfer Study. From the nature of this study, it should be obvious that deans and students did not discuss nor did they record all of the relevant factors in a student's decision to leave the School of Education for the College of Letters and Science. On the other hand, many of the responses which the students gave might easily have been relevant for more of those who transferred. Indeed, many of the students who remained within the School of Education may be supposed to be affected by the same problems--indecisiveness, personal problems, and dissatisfaction with their education. This study only indicates areas in which problems may exist; it does not define the outer limit of their extent.

A small number of students were shown to have had marriage and family problems which caused them to leave the School of Education (Table VIII). The total significance of this problem is not known. Other students who marry struggle through to a degree in the School of Education, drop out without transferring, leave teaching shortly after graduating, never teach at all, or otherwise have problems whose extent cannot be indicated directly in this study. For example, a woman with a husband and a child to look after could not leave Madison to practice teach. She transferred. Another married woman had to finish her degree quickly or not at all because her husband was relocating. In short, what this study indicates may be only the tip of the iceberg. The outlines of the rest will have to await the implementation of WETEP.

Benefits of WETEP to Elementary Education Student Retention

Whatever the expressed reasons for students leaving the School of Education, comments made in the study indicate that the institution should be aware of these findings and should seek additional evidence to determine what strategies should be undertaken to assure that students make their decisions about their future as teachers on appropriate criteria and not on reactions to program inadequacy. Most students who dropped the elementary education program were academically competent. There is reason to believe they had as high gradepoint averages as those who elected to remain in the program.

Another interesting observation is that a number of the students indicated that other fields attracted them because they could more ably express themselves. They seemed to feel that in fields such as art, music, and sociology they could "do their thing", while in education they could only translate it. WETEP will offer students opportunities to creatively express themselves in the "modeling" behavior of the WETEP teacher.

The primary benefit on student retention which will be provided by WETEP is a more adequate data source on attrition of pre-service elementary teachers. It is expected that WETEP will be able to reduce attrition by more appropriate counseling, by improved screening and orientation, and by providing a program designed to individual requirements.

For those for whom separation has been involuntary in the past, additional benefits are possible. Students will have exposure to a greatly superior program tailored to their specific needs. Hence, they are more likely to complete the program successfully. Also, program re-entry will be provided for those who have to drop out for a while due to temporary personal problems or grade difficulties.

Currently there is no data available to enable the WETEP staff to compare the factors involved in attrition within the program and the eventual entrance into teaching or success in teaching. The implementation of WETEP with its research facility will provide this missing data. WETEP is designed to attract more potentially successful people, men as well as women, into the program. Attrition from the program is expected to vary in direct proportion to the success of the WETEP faculty in permitting exploration and in helping students make realistic decisions about their professional careers.

Introductory orientation programs seem, from the results of this study, to be greatly needed as part of this exploration in the School of Education.

Another aspect of WETEP which will produce benefits for retention and for the education profession is the personalized context within which instruction is offered.

Above all, WETEP will allow for maximum flexibility in arranging students' programs to their own particular needs, organize counseling for students, and rationalize the advice given to them so that they may have a more individualized relationship with the School of Education.

BENEFITS TO TEACHER RETENTION FROM WETEP

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192/193/194

Introduction

Currently over 200,000 teachers are being certified annually by the nation's colleges and universities. There is every reason to believe that this number will increase significantly by 1980. The financial investment in preparing these teachers is substantial now, and many indications point to an increase in cost in the years ahead. In fact, if teacher education follows the general estimates for all colleges and universities, by 1980 its annual costs will increase 114 per cent from its 1965-66 outlay. One important view of these costs is in terms of the number of teaching man-years obtained per dollar invested in teacher education. The present study is designed to investigate the relationship between the nature of the teacher education program and teacher attrition under the elementary education program currently underway at the University of Wisconsin, and to make suggestions concerning the potential for change in this relationship through WETEP.

This paper is designed to provide information about the current picture of teacher attrition (where and why they go when they leave) and the manner in which WETEP may influence its students to stay in the elementary school after they graduate from the program.

Review of Research

National Teacher Attrition Rates

Teacher attrition is a serious problem in education. It costs money to find and educate replacements; educational quality is reduced because of this staff and curriculum instability. In 1967, the NEA, or the basis of a nation-wide survey, estimated that 6 per cent of those teaching in the public schools would not be employed in the profession one year from then.[1]

The loss among married women appears to be even higher. In a study done the preceding year, it was found that in addition to those leaving school for various other reasons, another 6 per cent of the married women expected to devote the next school year to full-time homemaking. The report, in making projections from its sample, estimated that 44,000 teachers would leave for homemaking in 1966-67--more than twice the number who had returned from homemaking to teaching during the year of the study.[2]

The writers acknowledge the assistance of Robert J. Fullmer in gathering background data for this paper.

[1] National Education Association, "Teacher Mobility and Loss," NEA Research Bulletin, Washington, D. C., 1968, p. 118.

[2] National Education Association, The American Public School Teacher, 1965-55, Research Division, NEA, Washington, D. C., 1967, p. 52.

An examination of data in the above reports reveals an overwhelming number of women as opposed to men in elementary school teaching. The majority of these women are married. It appears, then, that the elementary school has a current attrition problem which is tied rather closely to marriage and the family.

But the elementary school of the future will encompass even more problems as it attempts to bring men into the elementary school. The 1965-66 report indicated that 3.5 per cent of the male teachers would leave the profession the following year for other employment.[3] Attempts to keep them in elementary teaching will have to be projected on a different basis than that for women since their departures are not due to marriage and family reasons.

Reasons Given for Leaving the Profession

In order to ascertain the kinds of benefits which WETEP might provide to help decrease the attrition rate, it seems appropriate to examine reasons given for leaving the profession.

In the NEA studies cited earlier, the major reasons given by men who moved or left the profession were insufficient teaching salary and poor working conditions. For women teachers, of whom 87.6 per cent were married, personal reasons and their husbands' job changes were the major reasons given.[4]

NEA studies also found that, of those married teachers who stayed in the profession, 61.1 per cent interrupted their teaching duties for a mean period of 8.3 years. Yet only 33 per cent of the married women teachers who had left the profession returned even after their family responsibilities lessened.[5]

Positions Assumed After Leaving the Profession

To bring the problem closer to the pre-service experience upon which WETEP is building, another NEA study should be reviewed here. Close parallels can be drawn between the figures cited earlier and those in this study which relate to newly certified teachers not even tapped by the schools. Some indication of the range of positions reducing the supply of teachers is also given.

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[3] Ibid.

[4] NEA, "Teacher Mobility and Loss," op. cit., pp. 117-126.

[5] NEA, The American Public School Teacher, 1965-66, op. cit., pp. 18-20.

In 1967, NEA examined the positions of certified beginning teachers. The study showed that 10 per cent of the qualified and certified teacher graduates did not enter the profession the first year.

These studies show where teachers go who temporarily or permanently leave the profession (see Table I).[6] However, the studies give no information about the reasons why teachers decide not to enter or stay in the profession. It is insufficient to say that the reason is obvious for a married teacher who leaves the profession to return to her home and family full time. But dissatisfaction resulting from such things as conditions, administrative relationships, salary, interpersonal staff relationships, and inability to resolve role conflicts may encourage a teacher to return to her family full time. In short, the so-call "real" reason motivating a teacher to make a decision to leave the profession must be exposed if it is to be dealt with meaningfully and effectively. No national studies dealing with these reasons were found in searching the literature.

Teacher Attrition in Wisconsin

Available data concerning teacher retention in the state of Wisconsin is at best minimal. The only relevant study was conducted over a period from 1953 to 1956 by the Wisconsin Education Association. The study was designed to determine teacher movement and loss in Wisconsin, but it did not delve into the area of motivation. In the 1956-57 school year, 13.9 per cent of the teachers in Wisconsin left the schools in which they were teaching. (This rate of loss was similar to that of the three preceding school years.) Table II describes where the elementary teachers (kindergarten through ninth grade) in this study went.[7]

Attrition of University of Wisconsin Graduates

Information available concerning the retention rates of those who complete the University of Wisconsin undergraduate teacher education program is even more sparse. The scope of the current problem is broadly defined by the significant changes in number of students who have been certified in the undergraduate program. From 1960 through 1968, 1031 people were certified. In order to get some idea of the task involved in following the subsequent careers of these

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[6] National Education Association, Teacher Supply and Demand in Public Schools, 1968, Research Division, NEA, Washington, D.C., 1969, p. 20.

[7] Wisconsin Education Association, "Teacher Movement in Wisconsin," WEA, Madison, Wisconsin, 1957, pp. 3-4.

TABLE I

POSITIONS ASSUMED BY 1967 ELEMENTARY EDUCATION CERTIFIED GRADUATES AFTER COMPLETION OF THEIR PROGRAMS

	Per Cent		
Teaching Positions	Men	Women	Total
In state	57.4	62.4	61.8
Out of state	15.0	16.3	16.1
Total teaching	72.3	78.7	78.0
Other Positions			
Otherwise employed	3.1	1.8	1.9
Continuing formal study	4.4	2.3	2.6
Military service	2.8	.1	.4
Homemaking	.0	3.2	2.8
Seeking teaching job	.7	.8	.8
Seeking non-teaching job	.1	.1	.1
No information	16.6	13.1	13.5
Total not teaching	27.7	21.3	22.0
Total per cent	100.0	100.0	100.0
Total number	7,340	59,700	67,050

Information rearranged from National Education Association, Teacher Supply and Demand in Public Schools, 1968, Research Division, NEA, Washington, D.C., 1969, p. 22.

students, the 126 undergraduates who were certified between January and August of 1967 were compared with the Wisconsin State Department's master list of teachers for the state of Wisconsin. According to that list, only 67 (53 per cent) of these people were teaching in Wisconsin during 1967-68. This 53 per cent can be compared to the NEA figure of 61.8 per cent in the national study for 1967 (see Table I).

Records at the University of Wisconsin provide no data at all on those who have left the state whether it be to teach or not. If 47 per cent of certified teachers from the University of Wisconsin program do not enter the teaching profession in this state, then it become necessary to build an entirely different set of policy criteria. This will enable the WETEP staff to determine benefits from a much broader national basis than current data allow.

TABLE II

REASONS GIVEN FOR TEACHER MOVEMENT AND LOSS IN THE WISCONSIN ELEMENTARY SCHOOLS IN THE 1956-57 SCHOOL YEAR

	Amount Leaving	
Reasons for Leaving	Number Leaving	Per Cent of Total
To assume home duties	704	30.29
To transfer to another school	701	30.16
To marry	215	9.25
To move out of state	200	8.60
To retire	93	4.00
To return for further education	85	3.67
To enter industry or business	83	3.57
Because of ill health	50	2.15
To obtain leave of absence	47	2.03
To enter the military	21	.90
To accept college teaching position	15	.64
Other	110	4.74
Total leaving Wisconsin Elementary Schools	2324	100.00

Job Dissatisfaction. An examination of some of the available data on job dissatisfaction should serve as a useful substitute for the absence of material on underlying motivation for leaving the profession. The substitution is based on the assumption that satisfaction encourages people to remain in their jobs, while dissatisfaction is liable either to make them unhappy teachers or to increase the likelihood that they will not find sufficient rewards to warrant their staying.

Two studies have been done recently enough to provide some insight into dissatisfaction. The first study, done in 1968, deals with 17 general problem areas which were ranked as major or minor problems in their schools by a sample of teachers throughout the United States. These problem areas (combinations of major and minor classifications) are listed in Table III according to the importance attributed them.[8]

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[8] National Education Association, "Teacher Problems," NEA Research Bulletin, Washington, D. C., 1968, pp. 116-117.

TABLE III

TEACHING PROBLEMS CITED IN A NATIONAL SAMPLE SURVEY OF TEACHERS

Teaching Problems Listed by 65 to 75 Per Cent of Teachers Surveyed

Insufficient time for rest and daily preparation
Large class size
Insufficient clerical help
Inadequate salary
Inadequate fringe benefits

Teaching Problems Listed by 55 to 65 Per Cent of Teachers Surveyed

Inadequate assistance from specialized teachers
Lack of public support
Ineffective grouping
Poor faculty meetings
Poor instructional materials
Poor testing and guidance programs
Poor consultive assistance

Teaching Problems Listed by 40 to 55 Per Cent of Teachers Surveyed

Poor administration
Discipline
Poor local organization of teachers
Low opportunity for professional growth
Poor attitude of colleagues

The second study ranked the sources of discouragement of elementary teachers according to the frequency of attention paid them by 1230 teachers answering the questionnaire (see Table IV).[9]

Of the teachers questions, 74.8 per cent listed one or more of these sources of discouragement. This, along with the previous study, points to problems and dissatisfactions teachers are facing. What percentage of teachers quit for these reasons is not known. But examination of problems faced by teachers who stay in the profession may provide insight into factors encouraging other teachers to return to the home, take outside jobs, or return for higher degrees and educational positions other than teaching.

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[9] National Education Association, *The American Public School Teacher, 1965-1966*, *op. cit*., p. 49.

TABLE IV

SOURCES OF DISCOURAGEMENT FOR ELEMENTARY TEACHERS

Sources of Discouragement	Per Cent of Teachers
Lack of time to teach	27.3
Insufficient materials	23.6
Negative attitudes of pupils and parents: discipline	18.0
Poor administration	13.3
Poor preparation of students	5.4
Unsatisfactory salary	3.3
Negative relationship with colleagues	2.8
Insufficient preparation for teaching	1.1
School reorganization	0.7
Other	1.0
Total reporting one or more of these sources of discouragement	74.8

Examination of the teacher turnover problem is a two-sided coin with loss to the profession coming up most often. However, teachers changing systems is an equally important problem. In spite of the high mobility rate known to exist among professional people, there is currently insufficient data to enable the WETEP staff to make decisions about mobility conditions which could be affected by WETEP. For example, in 1967 among all Wisconsin elementary teachers who had any kind of degree from the University of Wisconsin, 547 had been in the same system for two or more years, 279 for four or more years, 88 for eight or more years, 29 for twelve or more years, and 12 for sixteen or more years. The reasons behind the many changes are simply not known. The teachers could have changed systems because the family moved or for financial reasons. But they also might have moved because their understanding of the professional environment was unrealistic or because there was very little relationship between their own professional education and the kind of professional tasks they had to perform.

Potential Within WETEP for Improving Retention Rates

Relevancy. To date, there has been little systematic attempt to provide data about variables which teacher educators might manipulate to increase the retention of qualified teachers. There is a high utility for this kind of information. If the rate of retention could be increased, the operating cost of the school system could be reduced. But there is even more need for such information if the program of preparation is to be justified on the basis of benefit to the profession as a whole.

WETEP is projecting a new concept of schooling for 1975 and beyond, one which is more relevant to the needs of the teachers as they meet the needs of children. In accomplishing this, the preparation program itself must be responsive to the general need of providing qualified teachers. If they do not teach in the first place or do not stay once they are in the schools, then the qualifications are unnecessary. Retention of the qualified teachers, then, is a significant benefit for which WETEP will take considerable responsibility in cooperation with the public and private school personnel responsible for staffing and supervising.

Personalization. According to the studies cited earlier, it appears that one of the primary clusters of dissatisfaction and discouragement is in the area of school organization and school administration. More specifically, sources of concern center around insufficient time for rest and preparation, large class size, insufficient clerical help, inadequate assistance from specialized teachers, ineffective grouping, and poor consulting assistance.

Through the program, the WETEP staff addresses itself to this problem by acknowledging the intense differences among individuals preparing for a lifetime in education. By providing pre-service preparation in which the individual chooses his course of study, the level of sophistication, and the speed at which he moves, the program enhances the positive attitude of the student and prepares him to meet the demands of the school setting within which he will work.

A corollary position regarding the school organization and type of administration into which a WETEP graduate is placed must also be made clear. It is logical that a student educated according to his individual needs and interests will find a market for his skills. The WETEP staff acknowledges, therefore, the increasing need for differentiated staffing, and the potential such an arrangement has for a more personalized teaching (or non-teaching) assignment.

Technological Orientation. It can be expected that frustration levels and fear of technology will drive many socially-oriented, capable teachers from the schools of the future if no attempt is made to prepare them for the technological "revolution" which will begin to have a serious effect upon school programs in the foreseeable future. An analogy could be drawn between this situation and that of the housewife earlier this century who know that the refrigerator could do a better job for her and her family than the ice box. But it was too expensive, and, besides, she really wasn't sure what the actual benefit was anyway. Not only would she miss her trips to the market, but it would also take away her inventiveness. What would she have said had she known about today's frozen foods--all possible because she accepted the "frig"?

As a model program utilizing advanced technology and specific media components, WETEP intends, in effect, to make media as useful, as expected, as comfortable, and as versatile as the refrigerator is today--without increasing the TV dinners of the classroom beyond the tolerance or use for them by the children of the future.

In expanding the operational range of the teacher through media and technology, WETEP will provide greater stimulus for teachers to be creative and to work individually with children--a source of satisfaction of untold importance when considered in light of the two reasons most teachers give for entering the teaching profession: to work with young people and to render an important service.

Professional Competency. Among the studies cited earlier regarding dissatisfaction and discouragement, another cluster of factors dealing with competency can be identified. Apparently, a significant proportion of teachers feel inadequate to meet the needs of their profession. Teachers surveyed expressed concern regarding poor testing and guidance programs, poor instructional materials, ineffective grouping, low opportunity for professional growth, insufficient preparation for teaching, and negative relationships with other teachers.

The WETEP staff is committed to a program which will increase the teaching competencies of participants. By increasing the pre-service guidance, WETEP may help students to consider the demands of their profession and improve their areas of deficiency. Further, emphasis is placed on the ability to contribute intelligently toward change. Problem analysis, as an integral part of the teacher's education, will assist him in determining the causes of his dissatisfaction. The process of seeking alternate means, which is integral to the program, will provide the WETEP teacher with greater potential for satisfaction in meeting the needs of his profession.

Benefits of WETEP for Teacher Retention

Teacher retention is an important aspect of the cost effectiveness study of WETEP because it is crucial to the determination of teaching years obtained for dollars invested.

A study of several aspects of WETEP which are expected to raise teacher retention rates will produce research hypotheses to be tested quantitatively following WETEP implementation. These hypotheses will relate to the superiority of teacher preparation under WETEP and the possibility of education students' participation in various professional programs within WETEP.

Superiority of Teacher Preparation. WETEP teachers will be cognizant of the specific nature and needs of elementary education. Hence, they should be more responsive to the particular demands placed upon them in a teaching situation. The in-service education phase of WETEP is expected to provide additional support for elementary teachers in this area.

It has become increasingly clear to the faculty of the undergraduate teacher education program that the lack of follow-up information about the students who have completed the program, their subsequent professional experience, and their relative job success and satisfaction is a rather severe handicap in making decisions about the kinds of experiences that should be provided in pre-service programs. The failure to obtain this information has been due primarily to the lack of an over-all structured or concentrated attempt to guarantee the relevance of teacher preparation to the field conditions under which teachers work. It has also been due, undoubtedly, to the failure of pre-service personnel and elementary supervisory personnel to share the responsibility for integrating teachers into school situations.

WETEP is establishing working relationships with school administrators in developing policy guidelines for schools of the future. This gives WETEP a hand in the determination of school policies appropriate for increasing teacher retention. A significant WETEP task is to prepare prospective teachers to deal competently with situations which could reduce their desire to teach to the best of their abilities or which could prompt them to leave the profession.

Hypothesis: The amount of dissatisfaction among teachers can be reduced if they are made aware early in their pre-service education of what they might expect to find in subsequent teaching situations. It is vital that prospective teachers should complete their pre-service education and enter the profession only if their decision to do so is based on an honest appraisal of what teaching is all about.

Hypothesis: Teachers' understanding of administrative functions and problems reduces the dissatisfactions and frustrations created by misunderstanding between teachers and administrators, and helps them to see ways of resolving differences.

WETEP is designed to prove these theories.

The Right Person in the Right Position. Through screening, orientation, and clinical experiences, WETEP guides people into jobs appropriate for them. In essence, through its differentiated staff, its increased attention to personalized programs, and its breaking down of the task components in the WETEP program, WETEP encourages more people to stay in teaching. WETEP further breaks down job description within the elementary school to guide each person into the right job. This may mean a teacher's concentrating on teaching communications or science or on being a media specialist on a team. By increasing the personal satisfactions to be derived from matching talent to assignment, WETEP increases the probability of teachers choosing to stay in the teaching profession.

Differentiated Staffing. Each WETEP student may prepare for any of a number of positions within elementary education: teacher, paraprofessional, master teacher, specialist, media specialist. The effect of these professional advancement opportunities is unknown at present; thus comparative studies are not feasible. However, a study of the performance characteristics of those who choose specialized areas and the subsequent concerns of persons attaining advanced professional status will provide some measure of the benefits of this phase of WETEP.

The range of education jobs in the future is likely to increase rather than decrease. All those involved in materials production, technological support, and research eventually must become part of a team operating in the elementary school. It will be necessary that the team in the school of the future should not be composed of 24 classroom teachers and a principal. In many schools the trend toward using paraprofessionals, special teachers, and guidance personnel can already be seen. WETEP expects to initiate much of the training of elementary teachers for these programs in its pre-service program.

In the past, pre-service education and differentiated staffing were unrelated. First, one became an elementary teacher; then, if he wanted to do some different job, he had to be retaught or be given a new education program. WETEP will make this function continuous by emphasizing, encouraging, and, in fact, carrying on a program that both anticipates and prepares for the directions in which its graduates might go.

Increased Power to Attract and Retain Males. The benefits of having males in elementary schools have received much attention in professional literature, but almost always in the vein of "Yes, it would be nice," or "If only we could, but. . ." Potentially, the male teacher can contribute as a human being to the elementary education of the child in a number of ways. Perhaps his most important contribution is his projection of a positive male image in contemporary American society. By projecting the male in the intellectual world and a male role separate from the father role, he can help to develop in children of both sexes an appreciation of how adults, both male and female, operate in society.

WETEP intends to make elementary school work more attractive to males. Greater freedom to select the kinds of experiences they want to engage in, available through differentiated staffing and greater personalization of the program, will enable more men to visualize a future in elementary education as professionally desirable.

WETEP intends, by its individualization and its greater range of learning experiences, to provide more programs that the male can respond to without fearing that he must constantly defend his male ego among women. WETEP will also provide in-service opportunities for teachers and its own faculty to consider ways to strengthen the position of the male in the elementary school.

Part-Time Professional Participation. Among the more serious problems of elementary schools is lack of effective utilization of all available talent. The Renaissance teacher was close to his students and totally responsible for their education during the year. This was feasible at a time when the majority of children were not in school and the supply of teachers could keep up with the demand. Currently, many schools have become so bound in certification rules and in standardizing teacher qualifications, that a distortion has been created in the utilization of staff. School administrators have become so used to putting a teacher in the classroom regardless of reason, interest, or qualification that they are in danger of forgetting the children.

Now, with the alternatives offered by team teaching and differentiated staffing, it is reasonable to consider the use of part-time personnel in school situations. In its clinical elements, WETEP utilizes part-time staff members both to develop and to demonstrate staffing patterns. In its orientation and guidance programs, WETEP assists future teachers to consider alternatives that will enable them to resolve "all or nothing" conflicts, or, if they have accepted non-teaching alternatives, to encourage them to use their teaching knowledge in appropriate school settings. This kind of participation is anticipated from those who currently devote large portions of their time to home duties or to other occupations. WETEP will demonstrate that educated teachers who do not wish to teach full time can still be integrated into the school setting.

The WETEP staff considers it possible, by helping to establish a more personal teaching setting, to retain at least a portion of those approximately 30 per cent of teachers in Wisconsin who must leave teaching to assume home duties (see Table II). Possibly, through differentiated staffing patterns, a teacher may be employed part-time;

increased benefits such as a child care center operated by the school may help the teacher-mother; decreased record-keeping and clerical duties resulting from the employment of aids may help; and video instructional programs directly from the home may prove to be an answer in some cases.

Future Research Related to Retention

It is obvious that much needs to be learned about the retention of teachers. The research reported in this paper provides only minimal information about the reasons teachers leave the profession. From this information, inferences about causes were hypothesized. However, the WETEP staff also recognizes the need for a more systematic analysis of teacher retention.

More adequate current statistics are needed. More refined techniques for gathering such information and greater care in analyzing the statistics are necessary. Specific changes in the process of teacher preparation might result. Both the Wisconsin Education Association and the Department of Public Instruction have agreed to join with the WETEP staff in developing research to study the profession's loss of teachers.

Specific questions need to be answered more satisfactorily: What causes the profession's loss of a significant number of qualified teachers? Why do teachers leave a specific school and move to another school? What are the real reasons for teacher dissatisfaction? What interpersonal relations and what role and personal conflicts result in dissatisfaction? What relationship is there between the preparation of teachers for general placement (regardless of socioeconomic consideration) and the preparation for specific placement? Is there truly a more positive attitude when teachers are trained to teach in different staff patterns? What are the causes for so few males entering elementary education, and what can be done to retain those who are presently classroom teachers?

One very clear requirement for the WETEP program is the establishment of a follow-up unit in the Student Personnel Dean's Office. This unit would be designed to systematically collect data on University of Wisconsin graduates who are potential teachers. Such a unit could be modeled after one which has been designed in Idaho.[10] Among other tasks, a questionnaire would be sent to all Wisconsin teachers who quit teaching or changed teaching jobs and to those certified who didn't accept a teaching position in the first place. Valuable data would be gathered on WETEP graduate turnovers as opposed to other teacher turnovers, job dissatisfactions relative to these turnovers, and reasons for resignations. Similar questionnaires will be sent to all graduates of the program to determine job satisfaction and other information valuable to continuing study of teacher retention. Such a system would provide data which would allow WETEP to begin more careful assessment of the effects of its teacher education program in addition to the study of teacher retention.

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[10] Donald C. Orlich and Evelyn M. Craven, "The Development of an Information System for Teacher Turnover in Public Schools (Including Uniform Reporting and a Computer Program)," Idaho State University, 1968.

PART III

WETEP SUPPORT SYSTEMS

The WETEP instructional program is clearly delineated within each of the element reports in Volumes I through IV and a summary of instructional events and program benefits discussed in Part I of this report.

In addition to these instructional elements WETEP requires a number of support systems essential to the effective operation of the total program. Part III of this report describes in some detail these support systems and discusses the benefits to be derived from their implementation.

Each of these support systems represents a sub-system of WETEP. The manner in which these sub-systems will be managed is the subject of the first paper in Part III. Associated with the management system is the Program Review and Evaluation Procedures (PERT) which will provide needed information to WETEP management. The benefits of new assessment procedures in a technologically oriented learning environment are described and the essential nature of in-service education for the WETEP teacher education faculty is emphasized.

The technological support system, which is the result of substantial interaction between the University of Wisconsin and Radio Corporation of America staff members, identifies many of the problems associated with specifying at this time the specific nature of the technological facilities for WETEP. Tentative solutions are hypothesized and prices are associated with these selected technological support possibilities.

The Future-Planning Center is a requisite to relevance for WETEP in the years ahead and the benefits of that program are described in Part III. Finally, the research potentials and the benefits to the research community are clearly defined in a discussion of WETEP as a research facility.

A SYSTEMS ANALYSIS APPROACH TO WETEP MANAGEMENT

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210/211/212

Introduction

The Wisconsin Elementary Teacher Education Project is committed to achieving excellence in elementary education through systematic innovation and continuous evaluation of a teacher education program. The implementation of fundamentally new approaches to teacher education provides the opportunity to adopt techniques and staffing patterns which have heretofore been unavailable to research and development efforts operating within traditional programs. The relative ease of embracing change imposes both extraordinary opportunities and exceptional problems; the purpose of the WETEP Management System is to assure that the maximum contribution to educational goals be generated by the model program.

This report explores the opportunities and problems involved in the management of WETEP. The remainder of the introduction motivates the need for a sophisticated management system for WETEP. Three factors are identified in this introduction as contributing to WETEP management requirements: WETEP's commitment to serving the educational community, to meeting the needs of individual students, and to evaluating an instructional program using cost effectiveness techniques. These factors are the subject of the following three major sections.

In order to obtain the maximum gain in educational value from the model programs project, innovations in teacher education must be devised which educational theory and research imply would be most successful. However these proposed innovations in elementary teacher education programs destroy substantial parts of the traditional structure of higher educational institutions by redefining the roles and relationships of professional educators and vastly expanding the reliance upon technology. Traditional methods of integrating education activities, of allocating staff and of relating the program to the larger educational community are being challenged in preparing program specifications. The need to assure that such an innovative program is feasible in the sense that it will be embraced by the supporting institutions and faculties cannot be over-emphasized; the management system developed to integrate the program must address the problems of designing incentives and structures that will induce cooperation and creative involvement with the model project.

The ultimate goal of WETEP is to achieve excellence in elementary education through improved teacher preparation. If the model program is to meet this objective, the development and implementation of the program must be subjected to continuous evaluation. In short, the research and development dimensions of the model program demand that a system be developed which will assure the timely flow of performance and cost information and the continuous scrutiny of this data. It should be apparent from a study of the program specifications and from educational research that the instructional and research and development aspects of the program are not independent; they are related both as they simultaneously impose input requirements and as they support and reinforce one another. The program of evaluation must therefore assume a systems perspective if the maximum performance of the project is to be achieved. The WETEP Management System must assure that information regarding the program's performance and input requirements is being generated in an analytically useful form and must provide for the rigorous evaluation of the program elements in terms of cost-effectiveness decision criteria.

The study of management feasibility has concentrated on an exploration and delineation of functions which must be fulfilled within WETEP and problems which are likely to occur in carrying out those required functions. In this report, emphasis has been given to a thorough scrutiny of the needs of the program and the constraints placed upon it by its university and societal environment. The analysis of WETEP management needs suggests that management feasibility depends upon the ability of the program to develop a flexible approach to management which can be applied to problems at all levels of management activity. Thus, instead of presenting detailed specifications as to the operational characteristics of the WETEP management system, this report emphasizes the functions which such a management system will perform.

Three major factors contribute to WETEP's management requirements. The first of these is that WETEP is designed to respond to the diverse needs of the total educational community. That community includes both public and private schools. These schools have particular needs and represent forces which will have an impact on the evolving nature of WETEP. The University of Wisconsin represents a community with interests and requirements which provide essential direction to many aspects of WETEP. The nature of the curriculum, the role of the faculty, the requirements for students, and the availability of funds are all matters which are ultimately under the control of the University of Wisconsin. The education profession, represented by research and development activities and professional organizations also has needs and interests which WETEP is designed to reflect. Finally, WETEP must be responsive to the society it serves now and in the future.

The second factor imposing management needs upon WETEP is its responsiveness to the individual requirements of students. The WETEP instructional program permits a wide choice of professional goals for prospective teachers, and a wide choice of learning sequence and instructional modes. WETEP will manage the resources necessary to provide each student with appropriate opportunities given his goals and previous experience.

The third factor for which the management system is essential is the need for continuous information on the effectiveness and the cost of particular learning events and sequences to assure that the greatest educational value can be obtained from the available funds. WETEP has a commitment to incorporate the results of cost effectiveness and cost benefit analyses to provide this assurance. The management of this effectiveness and cost information is underway through the initiation of this Phase II report so that appropriate decisions can be made concerning the continuing development of the program.

This report is presented in three sections. Each section examines one of the major factors which contribute to WETEP's management requirements. The first section identifies the nature of the task required to meet WETEP's commitment to the diverse needs of the educational community. The second section considers WETEP's commitment to meeting the needs of individual students. Finally, the third section describes the ways in which management techniques will be used to assure cost effectiveness in WETEP operation.

Meeting WETEP's Commitment to the Educational Community

The U. S. Office of Education Models Program is a response to the need for an improved program in elementary teacher education, a need which has been articulated by the professional education community. WETEP, in responding to this need, must provide a continuing flow of information to the professional community in the form of ideas, procedural techniques, materials, and demonstration facilities.

WETEP's Relationship with the Educational Community

The network in Figure 1 graphically represents the interrelationships among all organizations and organized activities affected by and affecting WETEP. Organizations (elements[1]) are indicated by numbered nodes, and those organizations which are predominantly or entirely a function of WETEP are represented within the boundary and include operations elements. Input and output elements are represented outside the boundary. Illustrative relationships among the various elements are represented by lettered arrows.

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[1] These elements are systems analysis elements and are not to be confused with program elements (e.g., Educational Psychology Element, Early Childhood Element, Culturally Diverse Element) described throughout the WETEP specifications.

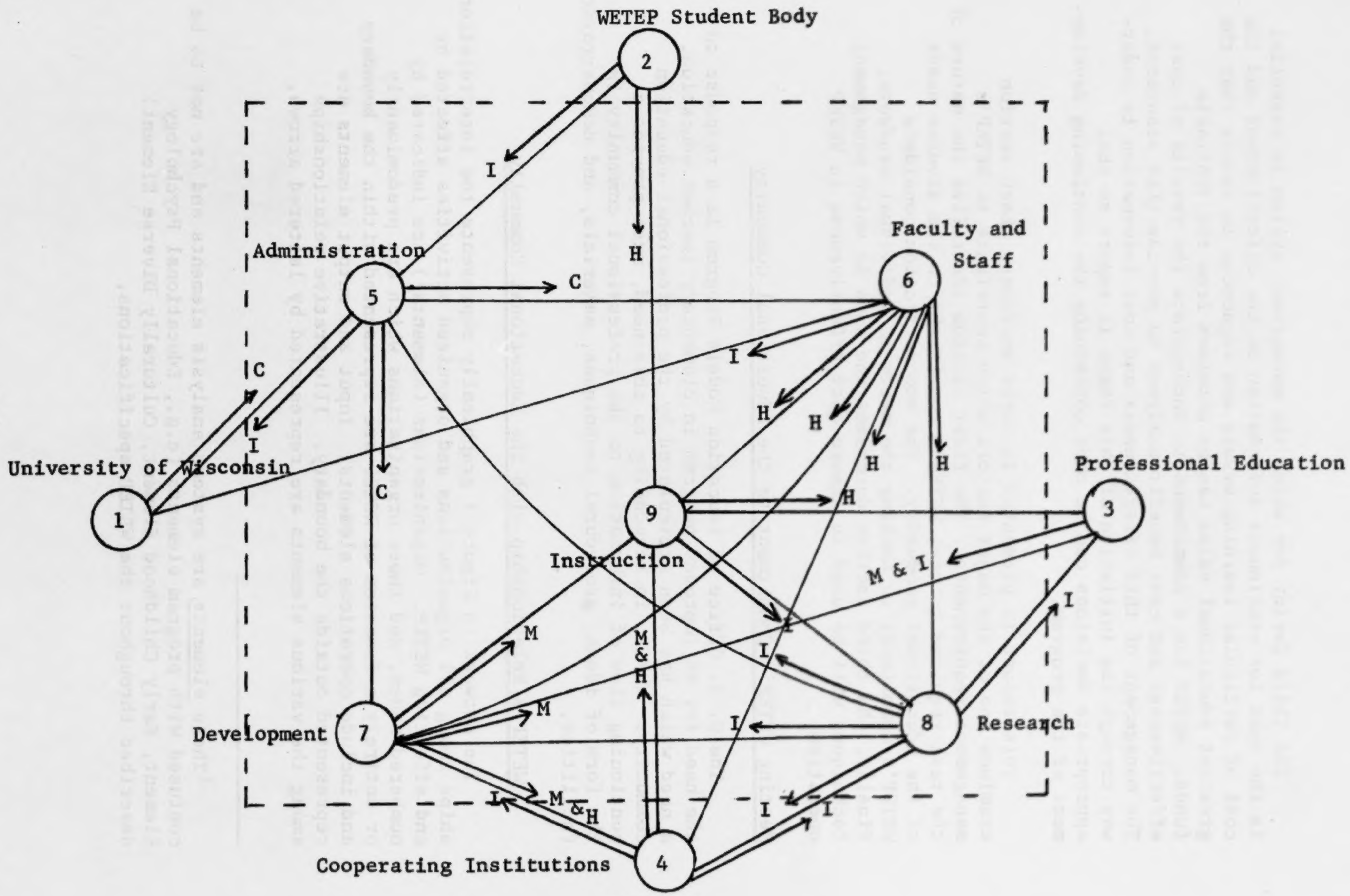
WETEP Student Body
2
Administration
5
Faculty and Staff
6
University of Wisconsin
1
9
Instruction
Professional Education
3
Development
7
Research
8
Cooperating Institutions
4
I
H
C
C
I
C
I
H
H
H
H
H
M & I
I
M
M
M & H
I
I
I
I
I
M & H
I
I

FIGURE 1
ELEMENTS OF THE MANAGEMENT SYSTEM

These letters indicate the major vehicle for or type of communication between elements according to the following code: H = Human Resources; C = Control; I - Information; and M = Materials.

WETEP's commitment to the educational community is essentially represented by its relationships to the four elements of the system identified as the University of Wisconsin, the WETEP Student Body, Cooperating Institutions and Professional Education. These elements provide sources of information, control, or human and material resources, which affect WETEP. Because they exist independently of WETEP, their primary functions are outside the major emphases and concerns of the WETEP program. Nonetheless, these elements have a profound influence on the nature and direction of WETEP and on its opportunities and restrictions, because WETEP can exist only with their support. Each of these elements will be briefly discussed in terms of the relationships with WETEP which will need to be established and the communications flow for which the management system will be responsible.

The University of Wisconsin. The University of Wisconsin provides the immediate context in which WETEP will model instructional programs in teacher education. University activities posing continuous problems for WETEP are related to traditions and policies regarding faculty responsibility and freedom. WETEP requires a shift in the focus of authority from individual faculty members to a faculty group jointly responsible for undergraduate teacher education. The problems posed by this transition from decentralized authority to centralized authority present a major challenge. Faculty must understand new roles, must appreciate the importance of these new roles to WETEP's operation, and must be provided with incentives which will encourage their implementation of these new roles.

The School of Education is the division of the University directly responsible for teacher certification programs. WETEP is therefore under the direct administrative responsibility of the Dean of the School of Education. Committees of the School of Education to which WETEP will be responsible include the Elementary Teacher Education Committee and the Teacher Education Program Committee. It is within these committees that recommendations concerning policy change will be determined and forwarded to the faculty of the School of Education for final action. The importance of receptivity on the part of committees within the School of Education and the university as a whole to WETEP's objectives and program structure will place demands for continuing, extensive communication up in the management system.

All WETEP faculty hold their academic ranks in departments. Policies for faculty workload, merit increment, rank decisions, and academic leave are in the control of departmental faculties. The management system must be sensitive to the need for mutual responsiveness between these departments and WETEP.

Programs and services in addition to the School of Education and the academic departments will require coordination through the management system. Of major importance to WETEP are the Graduate School, the University of Wisconsin Computer Center, the facilities of the Communication Arts group, and the Wisconsin Research and Development Center for Cognitive Learning. The management of the information flow between these university agencies and WETEP is a major and important task in the administration of WETEP.

The WETEP Student Body. Although the major concern of WETEP is with those members of the University student body interested in preparing to teach in elementary schools, an awareness of the nature of the entire student body on the campus is important. The effect which increased student activism will have on WETEP and the responsiveness of the instructional program to student opinion must be a concern of those developing and evaluating the program.

Direct student influence on WETEP is expected to be provided in two ways. First, students will be represented on various committees responsible for the administration of WETEP. Student membership on the Executive Committee, on committees responsible for program planning within the various disciplines, and on committees responsible for continuous review of the operation of WETEP will assure participation in decision making by those members of the university community who are most directly affected by the nature of the WETEP instructional program. Second, the system which provides for student choice in a variety of ways and also monitors student progress within the instructional system will provide a continuous assessment of student success and student reaction to instructional events, modules, and elements. The close personal relationship between faculty and students through the seminars and individual conferences will also assure opportunities for continual assessment of student reaction to many aspects of WETEP.

Professional Education. WETEP must be constantly aware of existing and developing innovations in teacher education. WETEP must utilize innovative developments in the professional community through various dissemination activities. Input from professional education includes research and development activities which are underway throughout the community.

The importance of research activities to maintaining a flexible instructional program cannot be over-emphasized. Research has extensively explored many problems associated with the development and implementation of instruction in the schools and in higher education. WETEP will extend this exploration through continued refinement of educational research questions and through new research procedures inherent in the system approach to be used in the development and instructional implementation of WETEP.

Development activities underway throughout the profession will also have an impact on the development of instructional materials and instructional procedures within WETEP. Specifically, the activities of Educational Research and Development Centers and Laboratories must be carefully monitored. Working relationships with the Wisconsin Research and Development Center for Cognitive Learning and the University of Texas Research and Development Center for Teacher Education will be particularly important in making use of the products of those centers which contribute directly to WETEP in the school and in the teacher education program.

WETEP management must overcome problems of extending to the educational community benefits derived from the development and implementation program. This extension of WETEP into the educational community is intended to take many forms. First in importance is the implementation of portions of the WETEP instructional plan on other campuses. The management system must have the capacity to coordinate a smooth transition of instructional modules, elements, and supporting portions of WETEP from the University of Wisconsin campus to other campuses. This transition includes not only the establishment of the instructional program on these campuses, but in-service education for the receiving college or university faculty as well.

Of additional importance to the educational community will be the establishment of a demonstration center which will provide opportunities for both short- and long-term visitation for observation and participation in the WETEP program. Special visitation programs will be established and managed by the administration of WETEP for day-to-day visitors on campus. More important, however, are the plans for visitors on summer, semester, or academic year, post-doctoral fellowships to participate directly in various aspects of WETEP development and instructional implementation. Depending upon the interest (and competence) of these visiting professionals, they will be directed to research, development, or instructional aspects of the total program.

Instructional materials prepared for WETEP will be distributed to the educational community through a variety of channels. In prototypic form these materials will be available directly from WETEP; completed, packaged materials will be available through commercial sources as reflected by the needs and interests of the professional community.

Finally, dissemination activities will include distribution of written documentation describing programs, development procedures, and research findings as the program progresses. These activities will be reported in official documents from WETEP and through professional journals.

Cooperating Institutions. The problems associated with the development and implementation of WETEP require the assistance of local school systems, the business community, the resources of profit and non-profit organizations, and the support of the State Department of Public Instruction. Coordination of WETEP activities with these cooperating institutions must be conducted through the WETEP management system.

Cooperating school systems will provide clinical experiences consonant with the orientation of WETEP. At the same time the major direction of WETEP must reflect the needs of local schools. At a variety of levels, the management system will coordinate the flow of necessary information between these schools and WETEP.

The education-industrial complex presents problems of special significance to WETEP. Needed are the skills, competencies, and resources of the business community, but this relationship must flourish in an open environment free of entangling commitments. The management system will coordinate the growth of the partnership among RCA, in private enterprise, ETS in the non-profit sector, and WETEP.

The State Department of Public Instruction certifies teachers in the State of Wisconsin. The problems associated with insuring that experimental programs fulfill certification requirements specified by law will require close coordination and cooperation with this agency.

The preceding discussion has revealed numerous management problems involving the institutional environment within which WETEP must operate, the personnel requirements imposed by the structure of the instructional program, and the extent of coordination with cooperating agencies and institutions required by the diversity of WETEP activities. This identification of problem areas is a necessary prelude to any attempt to devise management procedures. The remainder of this section is devoted to the development of an approach which can facilitate management functions within the variety of contexts which have been described here.

WETEP's Use of a Systems Approach to Management Decisions . WETEP's approach to management is based on the assumption that a technique exists which will assist the WETEP decision makers at all levels in making management decisions. Systems analysis provides a general procedure which, when well applied, has promise of helping in a wide variety of decision making situations.

Systems analysis has been described in a variety of ways.[2] Many philosophies and approaches to the use of systems analyses in education have been proposed. At one extreme is the normative position that qualtitative models must and will control all aspects of education, and anything not quantifiable or controllable is to be discarded. At the other extreme is the experiential position that education is not amenable to quantification and that efforts to quantify educational outputs result in the neglect of our most important educational goals. The following discussion of a systems approach to management describes the WETEP interpretation of systems analysis as it may be used to facilitate decision making.

Figure 2 illustrates the flow of activities involved in applying a systems approach to the solution of a single problem. The major steps in doing a systems analysis are problem formulation, the setting of objectives, determination of environmental criteria, recognition of resources and constraints, the development of alternatives and the evaluation of these alternatives and their presentation to a decision maker. In the following discussion, problem formulation is treated last because it involves all the other activities.

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[2] See, for example:

C. J. Hitch and R. N. McKean, Economics of Defense in a Nuclear Age, Harvard University Press, Cambridge, Mass., 1960; and E. S. Quaide, Analysis for Military Decisions, Rand McNally and Company, Chicago, 1964.

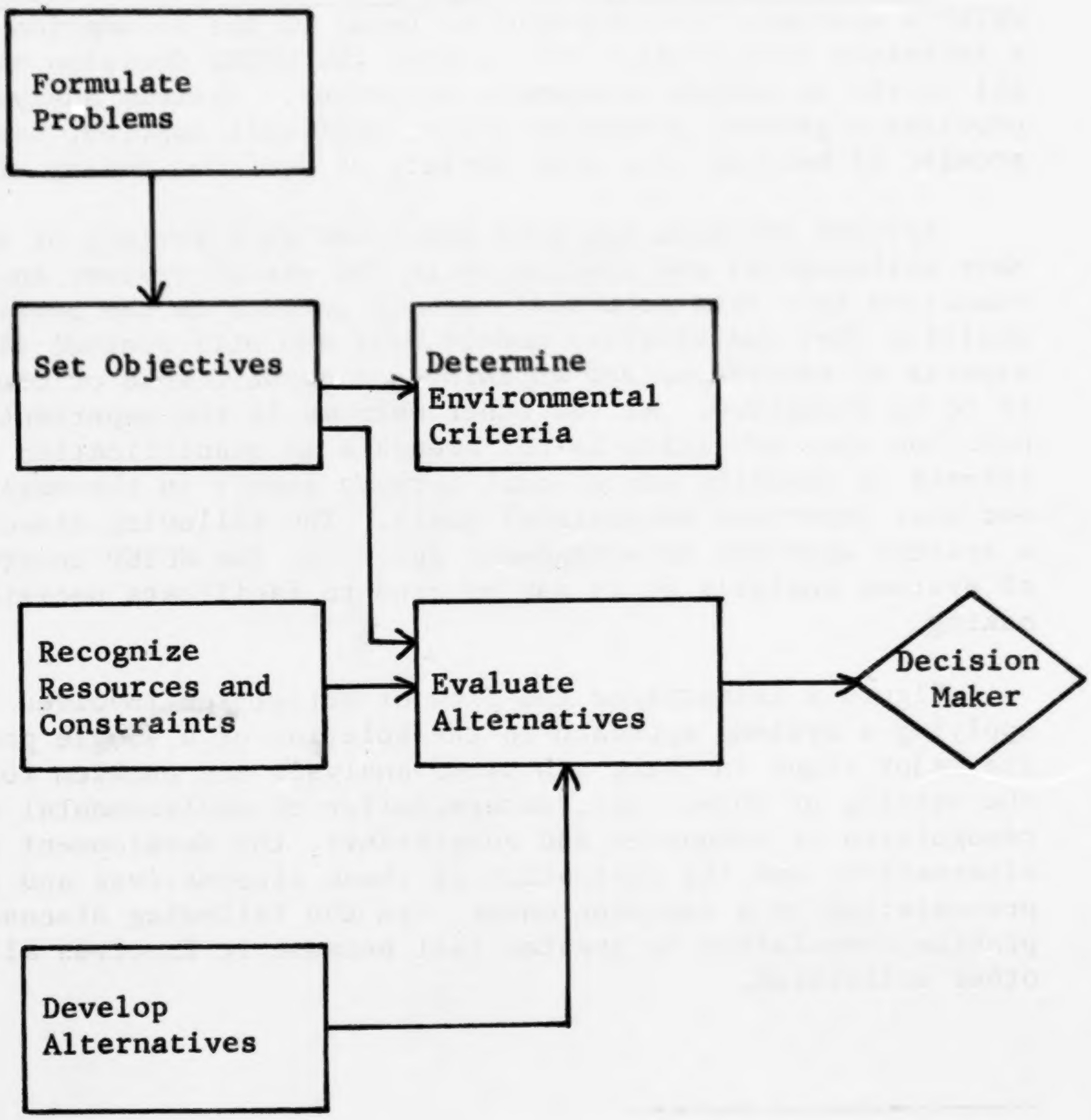
Formulate Problems
Set Objectives
Determine Environmental Criteria
Recognize Resources and Constraints
Evaluate Alternatives
Decision Maker
Develop Alternatives

FIGURE 2

MAJOR STEPS IN APPLYING A SYSTEMS APPROACH

Set Objectives. The establishment of objectives is central to any decision. WETEP is designed to include objectives which are stated behaviorally and which provide a general basis for educational decision making within the systems analysis framework. Decision making is always purposive. The setting of objectives must be in terms of the context of the decision, which includes the identification of a decision maker and a situation in which decision making will occur. Some objectives will be specific to a given point in time, relating to a student's progress through the instructional program. Such an objective may be related, for example, to some aspect of reading instruction. Other objectives will be recurring such as the objective "improve educational application of specific instructional modes."

Determine Environmental Criteria. The development of environmental criteria is central in decision making. Environmental criteria are those conditions which must be met in addition to the main objectives of any enterprise. In WETEP they offer guidelines for decision making when several alternatives are equally capable of satisfying the main objectives. The role of environmental criteria is perhaps best illustrated by the examination of a few instances in which they would affect the decision process. Perhaps the most important of the environmental criteria in WETEP is that of maintaining a personalized, humanistic emphasis while achieving the various specific goals within the program. For example, examination of the alternatives might clearly indicate the superiority of a specific procedure except that it violates the environmental criterion of personalization. Or, in considering means for the improvement of education for pupils in the schools used for clinical experiences within WETEP, analysis data may provide several equally suitable alternatives. Of these, the ultimate decision may well be made on the basis of the impact of that decision on programs in cooperating schools.

Concern for institutional change on the University of Wisconsin campus is another major environmental criteria which will be given much consideration in decision making processes. Change within departments, schools and colleges, and in central administration operations will be required for the successful implementation of WETEP. Decision making will take full cognizance of both the need for this change and the direction and stage at which the change has progressed as it relates to continuing needs in the developing WETEP.

Recognize Resources and Constraints. Resources and constraints represent the limits within which all alternatives must operate. Any program is constrained by resource availabilities; it is also constrained by its institutional, legal and traditional environment.

All constraints must be identified and considered in an analysis of a particular problem. For example, a limit on the number of faculty who are available to participate in some aspect of WETEP may result from constraints on available funds, available talent, or even available space. Constraints of other forms may be imposed by relationships with public schools, other higher education programs, state governments and federal programs.

Explicit identification of resource availabilities and constraints must be made to be used by the analysis staff as they develop and analyze alternatives. Accurate representation of all constraints is crucial since constraints define the range of possible alternatives. Furthermore, a change in constraints may alter an optimal decision.

Alternatives. The development of alternative means of meeting objectives is one of the most imaginative and important parts of any systems analysis. Even with appropriate objectives, excellent environmental criteria, and a full evaluation of resources and constraints, WETEP will succeed only if it has an ample input of creative alternative ways to achieve objectives. These alternatives may include choices of instructional subsystems, mediated instruction, instructional seminars and conferences, as well as the management and procedural alternatives necessary to achieve the objectives.

The importance of the ability of WETEP to communicate with all sectors of the professional community has been stressed earlier in this section. Alternative means of communication must be explored and evaluated. Alternative bases for WETEP's relationships within the university such as with the College of Letters and Science must be considered, for much of WETEP is dependent upon its coordination with other departments, agencies, and institutions.

Evaluation Procedures. Evaluation procedures are necessary in each decision making situation to determine how the alternatives meet the objectives considering the criteria, resources, and constraints. For instance, mathematical models, simulation, and simple techniques like checklists will be used to evaluate alternatives. Mathematical models assure optimization, but, in many cases, are difficult to apply. Simulation is a very general technique which allows for comparisons but does not assure optimization. Both techniques will be applied to assist in making the decision as to which of several activities should be carried out during each succeeding development period.

Decision Maker. The decision maker in WETEP may be the director of a sub-project or one of the directors of WETEP. He must understand the conditions of the study and the nature of the alternatives which have been considered. He can then select the appropriate alternative, fully aware of the background study undertaken to provide the information he has before him. The purpose for using the systems analysis approach described here is to assist the decision maker, who needs a substantial amount of information pertinent to the decisions for which he is responsible.

Problem Formulation. Problem formulation is the application of systems analysis--the determination of a problem. Problems may be formulated by those responsible for making decisions or by the analyst. Once a need has been clarified, the inputs, outputs, entities, attributes and structure of the system in question must be described. After the system is defined, higher and lower order systems to which it is related must also be identified. This step entails working down the analyst's goal tree by means-end evaluation to find points and levels at which analyses might be fruitfully applied. It is quite possible that a need in one area might result in analysis of another area where the problem is more urgent, the probability of success higher, the payoffs better, or the spillovers more important. The initial problem may be part of a more general problem needing attention or may even be unimportant in a global perspective. Even a well-formulated problem does not guarantee that a solution will be achieved.

Summary

The successful implementation of systems analysis in WETEP requires that it be accepted and used by personnel at all levels. It is a comprehensive approach to decision making, and not an external mechanism which can be superimposed on an on-going operation. There is, therefore, a crucial need to integrate systems analysis with all of WETEP. To accomplish this integration a series of seminars will be provided so that WETEP faculty personnel will be fully aware of the dimensions and nature of the system of which they are a part. The establishment of routine information-gathering devices for purposes of management will be organized to coordinate the various steps of systems analysis. Building this information-gathering system will make it easier for the staff to use systems analysis. The establishment of a Programming Planning Budget System[3] associated with systems analysis will be used at many levels for the development of program memoranda, for the allocation of resources between programs, and for information concerning the choice of alternative ways to carry out each program. The last section of this paper describes in greater detail the schedule of implementation of the systems analysis approach presented here.

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[3] LeRoy Peterson, "Introduction to Pricing", WETEP Feasibility Study, Vol. VI: Pricing and Economic Analysis, 1969.

Meeting WETEP's Commitment to the Individual Student

This section applies the three initial steps of the WETEP systems analysis approach to management in an examination of the instructional management subsystem. The previous section included a description of a general systems analysis approach to WETEP management. In order to test the feasibility of the approach for the solution of WETEP management problems, the instructional management system was selected for more explicit analysis. Because the instructional management system is central to WETEP operation and involves the coordination of a wide range of human and material resources, it is a logical choice for more detailed analysis. The section integrates the steps of problem formulation, objectives, and determination of environmental criteria in a statement of management needs imposed by the instructional subsystem. The section summary relates the requirements presented here to other Phase II reports which deal with other steps in the systems approach to instructional management.

The management requirements for the WETEP instructional system are indicated by surveying three interrelated aspects of the operational program: providing instructional resources to students, monitoring student progress, and conducting student assessment. The nature of WETEP requires careful collection and storage of data concerning the student's individually defined professional goals. Once these goals are recorded there is need for frequent monitoring of the student's progress toward them. Students may choose from among many alternative goals, element and module sequences, and instructional modes. These alternatives must be made explicit if they are to provide benefits to the student resulting from optimum choice within his program. A continuous monitoring of each student's progress and comparison of that progress with his predetermined program goals must be made to provide both students and faculty with information essential to effective program and career guidance.

To accomplish this instructional management task, a system must be designed which will both serve day-to-day needs of students and provide for long-range development and program flexibility. The management of the instructional program must therefore employ a systems approach.[4]

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[4] The cybernetic system designed by Albert H. Yee represents the use of the systems approach in planning all phases of teacher education. "A Cybernetic System for WETEP: A Model Design for the Preparation of Teachers," WETEP, Vol. I: Position Papers, 1969, pp. 47-76.

The operational means of serving the management functions for WETEP while utilizing a systems approach can be determined only after careful scrutiny of the requirements of the system.

Providing Instructional Resources

The task of managing the instructional resources falls into three categories: providing students with information concerning alternative sequences and instructional modes pertinent to their individual programs, managing the personal resources available to students, and managing the machine or technological resources of WETEP.

Providing Students with Information. In a system designed as WETEP is, to optimize a student's decision-making role concerning his own professional program, a vast array of information about the student and the WETEP program must be readily available. The dimensions of this task within WETEP are related to the expectation that each student will have identified a program unique to his interests. The instructional management system must provide constant comparisons between the student's self-determined program and the capabilities of the WETEP instructional program. Initially, of course, the laternatives within the WETEP instructional program are developed in profile form and are programmed for the computer. At the Input Component during screening and orientation, the student makes certain decisions about the design of his program of professional education. In cooperation with faculty and staff this three- or four-semester program is semi-formalized and programmed in profile form for computer storage. As the student progresses through the program which he has thus designed in broad outline, various alternative routes toward his described goal are regularly identified for him. The program monitors his progress. It checks both his self-described program, the program alternative in master design, and whatever special student characteristics might have accumulated during and since the time of initial input information.

Managing Personnel Resources. Central to the purpose of WETEP is the increased effectiveness of the personal interaction between students and faculty. Faculty and students meet in individual conferences and in seminars as a part of each student's instructional program, including the continuous process of evaluating his progress. Scheduling these staff resources at a time when students require them is a major task of the instructional management system. Making faculty available when they are needed poses a major problem. In scheduling seminars, it will be necessary to bring together at the same time a number of students who are ready for particular experiences at a given time. Assessment personnel, staff assisting with observation activities as in micro-teaching, and faculty responsible for field experience and intern supervision will need to be carefully scheduled.

Managing Technological Resources. The variety of instructional materials available in the WETEP system will be extensive. A large number of instructional alternatives will be provided to prepare professional personnel for the many different roles required in schools today. Alternative learning sequences and modes will be offered. Until the WETEP system is implemented and development studies can be conducted, the degree of flexibility in student choice, and the number of alternative goals and effective learning sequences and modes to be developed will remain uncertain. However, at this stage of planning, flexibility of alternatives in professional objectives and instructional strategies will be assumed in specifying management requirements.

The management of instructional materials involves the scheduling and recording associated with their availability as well as the actual presentation of these materials to students. Efficient processes will be necessary for adding new materials and for removing materials that are out-dated or considered ineffective. The materials which are to be a part of the WETEP instructional program may be classified as reading and independent study materials, audio and still pictures, video tape and film, and interactive instruction.

Reading and independent study materials will be indexed and readily available for students completing prescriptions from various modules or exploring specific ideas independently. The extensive cross-indexed system will eventually be computer-stored for retrieval on call.

Audio tapes will be available through a dial-access system or through checkout with small portable cassettes. The many tapes available will include both instructional materials prepared especially for WETEP and speeches and other presentations made at professional meetings or by professional educators away from the campus. These will be used by students both as a part of the instructional module system and as topics under study independently. Still pictures will be available on slides through dial-access. As in the case of all video materials, these slides will be available both for individual study and for presentation to seminar groups.

Video tapes will be available through dial-access. Some stored tapes will be directly related to various modules and others will be of more general use to the student independently exploring various ideas and for staff use in seminars. Additional tapes will be prepared by students or staff for specific individual or group purposes. Micro-teaching is one example of individual video tape use frequently identified as a part of the Curriculum and Instruction Element. In other cases seminar groups may raise particular questions which require the observation of children or teachers at particular tasks in a variety of environments.

In these cases special videotaping will be prepared for presentation to the seminar and later erased. Films prescribed in the instructional modules will also be available through the dial-access system. These films as well as some of the video tapes are expected to be viewed in association with other instructional modes.

CAI and Computer-Assisted Testing modes will provide some feedback to the student in terms of his understanding of the content which has been presented. These interactive modes of instruction at terminals, while occupying a minimal amount of time, represent an important source of instructional materials. The recorded responses of the student are expected to be maintained in the data base only as long as that student remains actively studying within that module. At the completion of a given module, a general summary or assessment of his work is made and the bank of responses to specific items is later erased.

Monitoring Student Progress

A sophisticated system designed to monitor student progress is an essential aspect of the WETEP instructional system. A major commitment of the program is to optimize the student's control over his own instructional program. This can be accomplished in a way which improves the effectiveness of instruction only if the student has ready access to a great deal of information about the program and his progress within the program. In considering the general nature of such a system, one must give attention both to the kinds of information which must be stored and the manner in which that information is to be later retrieved.

Storage of Data. WETEP is composed of program objectives, an organizational framework of elements, modules which have been designed to provide sequences of instructional opportunities, and the instructional events which are designed to provide the educational experiences planned for the student's achievement of desired objectives of the program. This organizational framework of Master-Instructional Plan (MIP) must be readily available for constant comparisons against individual student plans and progress.

At the Input Component during screening and orientation, each student designs his Personal-Instructional Program (PIP) which is in fact a subset of the MIP, with the help of the professional staff. From the time of the student's designing of his PIP, his own progress is compared with the master plan. Alterations in this program can be made, and indeed, will probably be made with considerable regularity as students become increasingly familiar with the potential of the Master Instructional Plan. The basic requirements will be essentially the same in each personal plan with the variety appearing in the specialist study and in the order in which students will choose to pursue both basic and specialist study. These personally imposed sequence requirements will be stored with their program plans so that in addition to the restrictions placed on alternatives by the Master Instructional Plan will be restrictions which the student himself has imposed. Thus, in information provided about alternatives, both the master and personal plan requirements will be reflected.

Considerable personal student data will be maintained within WETEP. These data will be used in two ways. First, the professional staff will be able to retrieve these data for purposes of student counseling and guidance. Second, although little is presently known about the relationship between certain personality characteristics and the effectiveness of given instructional modes, analysis of historical profiles once WETEP is operational is expected to provide insight into this relationship. Students with certain cognitive background and personality characteristics will be advised to choose certain alternatives and not to choose others.

WETEP achievement data for each student will be stored in a data bank in two ways. Much data will become a part of the student's permanent instructional profile, including pre- and post-assessment data for each of the elements and post-assessment data for each of the modules. Instructional data concerning module pre-assessment and event assessment will be stored only as long as the student is actively involved with study in that module. Once the module is completed and a permanent post-assessment is made and recorded, this temporary data will go into semi-permanent file for a given time, probably a few weeks, and will then be discarded.

Retrieval of Data. Retrieval of data in both simple and complex forms is required for the management of the WETEP instructional program. Individual student progress reports containing data stored following assessment activities must be readily available. Information which permits a comparison between two sets of data such as a student's set of progress reports and his Personal Instructional Plan must also be accessible. Data must be available to respond to such questions as: Given my present accomplishment and progress to date, from among what alternatives may I choose my next area of study? Another question of similar complexity is: I wish to undertake study in a specific designated module; have I completed the prerequisites for the module and if not, what prerequisites must I complete before undertaking that study?

The instructional management system must also have the means to provide information concerning the pattern of study underway by all students at any given time so that faculty resources can be efficiently scheduled for conferences, seminars and assessment interviews.

Summary

This section has presented the WETEP instructional program from the standpoint of the problems the management system addresses during WETEP operation. It relates, in many cases implicitly, the problems posed by instructional management, the environmental criteria which must influence management decisions, and to a more limited extent the objectives of the instructional activities. Additional Phase I and Phase II reports complete the specification of program objectives,[5] provide data on resource requirements,[6] and explore technological alternatives[7] and program alternatives.[8] While this entire Phase II report constitutes an evaluation of the various alternatives regarding the instructional program, final evaluation of alternatives must await more precise knowledge of resource availabilities. Therefore, this section (as well as the Phase II report) does not conclude with a statement of final choices made by the WETEP faculty.

Meeting WETEP's Commitment to Economic Efficiency

WETEP is committed to obtaining the greatest educational value from funds available both for development and operational activities. To insure optimal resource allocation throughout all phases of program development, each stage of development activity must be evaluated. Once WETEP has been implemented, the system must provide continuous information on the effectiveness and the cost of particular learning events and sequences. This commitment requires that resources be allocated to conducting evaluation activities. This section describes the steps by which a complete planning program budgeting system (PPBS) will insure optimal use of resources.

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[5] WETEP, Vols. II and III: Element Specifications, 1969.

[6] M. Vere DeVault, et al., "The WETEP Instructional Program," WETEP, Vol. V: Program and Support Systems, 1969.

[7] C. D. Sullivan, et al., "An Analysis of Technological Facilities Required for WETEP," WETEP, Vol. V: Program and Support Systems, 1969.

[8] LeRoy Peterson, "Pricing WETEP on the Madison Campus and Other Colleges and Universities," and Mary A. Golladay, "Economic Analysis," WETEP Feasibility Study, Vol. VI: Pricing and Economic Analysis, 1969.

The development of a WETEP management system utilizing the approach presented in this paper will be carried out as part of Phase III activities. This section describes the specific steps involved in management system development by means of networks. Two networks are described in this section, one relating activities for the first year of development and one indicating annual activities to be completed in each of the succeeding development and operating years.

Figure 3 presents management-related activities for the first year of WETEP development. The following discussion of activities identified in Figure 3 indicates the manner in which management system development will be related to other development activities.

Systems Management Development

Phase III Grant Received. The receipt of the grant from the U. S. Office of Education will start the project.

WETEP Systems Management Office Established. The WETEP Systems Management Office will provide detailed accounting and secretarial support, coordination and input of PERT and other computerized management systems, and will advise the director on the progress of the project.

WETEP Schedule and Budget Reviewed. The proposed schedule and budgets will be reviewed in light of any changes suggested by the U. S. Office of Education and any internal changes in personnel or schedule which may exist at that time.

Make-or-Buy Policies Developed. The decision regarding which services will be acquired from within the University, which services may come from other educational laboratories, which from other universities and which from independent consultants must be made. This analysis will formulate both policy and general guidelines.

Computer Support Contracted. The application of the make-or buy policy to computer support will lead to the decision of how the technical support of the project will be acquired.

WETEP Control Forms Designed. Forms will be designed for the recording of data both for operating and research bases. Final forms will be subject to revision throughout this initial development year.

Development of Computer Software Completed. Depending upon the make-or-buy decision for computer support, software will be developed either by a contracted service or within WETEP. These software packages will be designed to handle the data control forms.

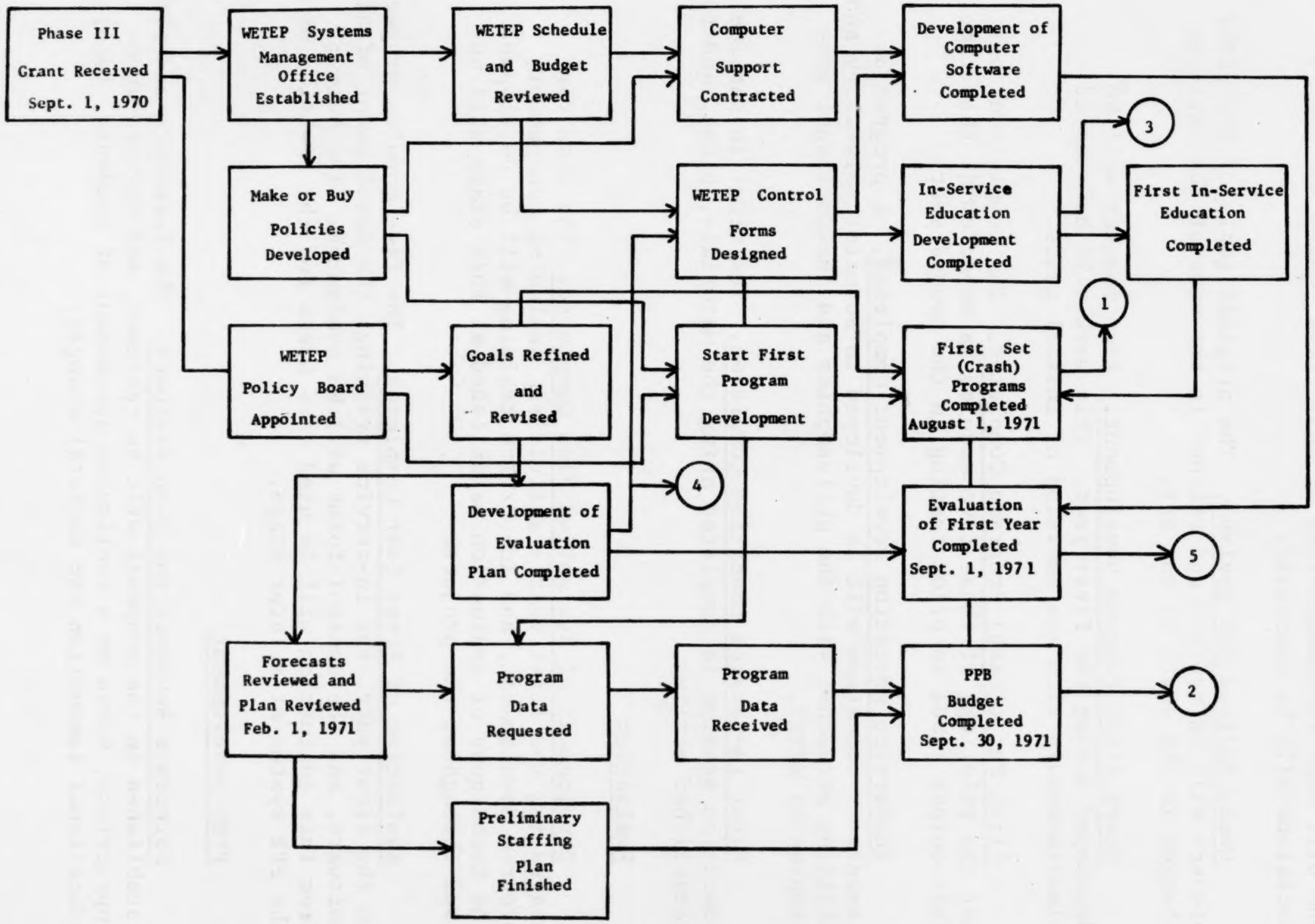

Phase III Grant Received Sept. 1, 1970
WETEP Systems Management Office Established
WETEP Schedule and Budget Reviewed
Computer Support Contracted
Development of Computer Software Completed
Make or Buy Policies Developed
WETEP Control Forms Designed
In-Service Education Development Completed
3
First In-Service Education Completed
WETEP Policy Board Appointed
Goals Refined and Revised
Start First Program Development
First Set (Crash) Programs Completed August 1, 1971
1
Development of Evaluation Plan Completed
4
Evaluation of First Year Completed Sept. 1, 1971
5
Forecasts Reviewed and Plan Reviewed Feb. 1, 1971
Program Data Requested
Program Data Received
PPB Budget Completed Sept. 30, 1971
2
Preliminary Staffing Plan Finished

FIGURE 3
MANAGEMENT OF RELATED ACTIVITIES--DEVELOPMENT YEAR 1

Program Development

WETEP Policy Board Appointed. A board of key decision makers who will make recommendations on objectives, goals and policy decisions will be appointed.

Goals Refined and Revised. The original goals of the WETEP project will be revised and refined in the view of the existing changes in the state of the art.

Start First Program Development. Five modules will be developed during the first year. This work will be started simultaneously with the revision of initial goals.

First Set (Crash) Programs Completed. The completion, but not the piloting, of these five modules is expected at this time. This output leads to pilot testing in the second year.

In-Service Education Development Completed. A program of in-service education will be developed to acquaint university and visiting personnel with the philosophies and instructional procedures of WETEP.

First In-Service Education Completed. The first in-service education session is completed using the materials, plans, and forms established earlier.

Evaluation

Development of Evaluation Plan Completed. The plan for evaluating the first year's activities, including management, program development, and in-service training will be developed. The techniques of evaluation established at this stage will be used throughout the project.

Evaluation of First Year Completed. The five modules prepared in the first year, the in-service training, the development of all software, and the control forms will be evaluated. The output from this evaluation will be used as a basis for the revision of the PPB system at a later stage.

PPBS Development

Forecasts Reviewed and Plan Reviewed. The forecasts and plans established in the proposal will be reviewed, and revised when appropriate, based on a continuing assessment of students, faculty, educational innovation and societal changes.

Program Data Requested. Forms to be used in requesting program data will be developed and distributed to WETEP personnel.

Program Data Received. The data request forms will be completed and submitted for evaluation of the program needs.

Preliminary Staffing Plan Finished. Upon completion of the funding, a staffing plan will be developed. This is necessary at this point in the academic cycle because of the early need to commit faculty personnel.

PPB Budget Completed. The first PPB budget using the information from the first year's experience will be gathered and used to plan the activities for the following year. This output provides the input for subsequent development. An analysis of this output indicates which programs will be funded at what level and which modules will be developed.

Figure 4 portrays the cycling of activities which will be conducted annually during the last four years of the development phase and during each subsequent year of operation. Each of these activities is described more thoroughly below.

Program Development

Start New Program Development. Given the PPB plan for the year, new programs will be started.

New Programs Developed and Completed. The planned programs for the year will be put into operation at this point. The new programs developed during the year will become the input for WETEP teaching pilot evaluations in the following year.

Start WETEP Teaching Pilot. The five modules prepared the second year (and in the following years the modules prepared in the preceding year) will be evaluated in pilots, generally at UW and occasionally at other institutions. Pilot testing is a central part of the development process.

Programs Completed. After piloting and evaluation of programs is completed, necessary revisions will be made and incorporated.

Annual In-Service Education Underway. In-service education of new personnel will be carried out each year.

Report. Reports will be prepared on each module which give the specifications of the module and detailed data of pilot per-

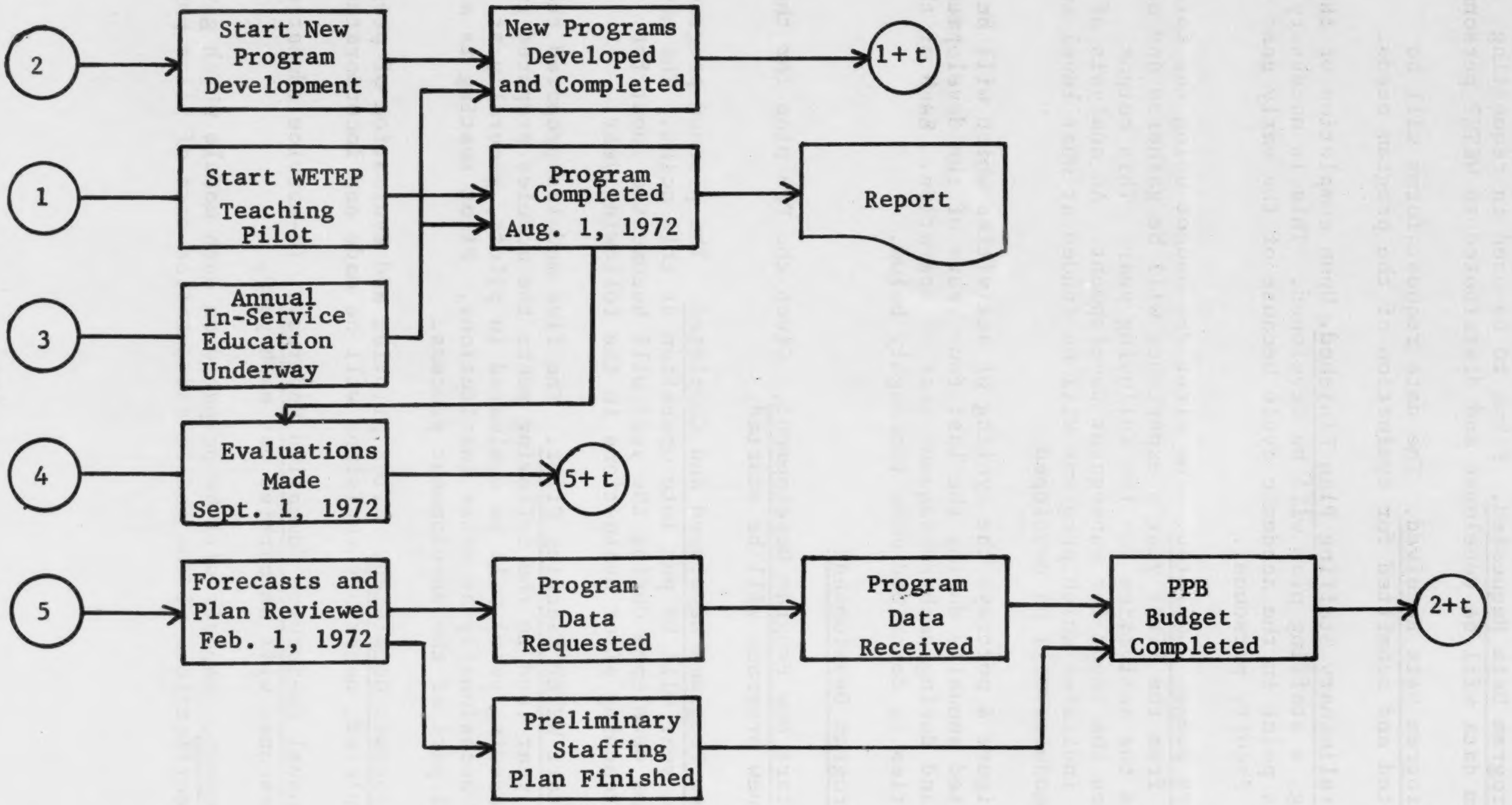

2
Start New Program Development
New Programs Developed and Completed
1+ t
1
Start WETEP Teaching Pilot
Program Completed Aug. 1, 1972
Report
3
Annual In-Service Education Underway
4
Evaluations Made Sept. 1, 1972
5+ t
5
Forecasts and Plan Reviewed Feb. 1, 1972
Program Data Requested
Program Data Received
PPB Budget Completed
2+t
Preliminary Staffing Plan Finished

FIGURE 4

MANAGEMENT OF RELATED ACTIVITIES--
DEVELOPMENT YEARS 2-5 AND FOLLOWING

formance. If a module must be redone, it will be programmed in PPB and recycled through the program development sequence.

Evaluations

Evaluations Made. The evaluation procedure will be applied.

PPBS Development

Forecasts and Plan Reviewed. Each year an additional year will be added to the multi-year forecast and plan. In addition, the previous year's plan must be reviewed and forecasts checked.

Program Data Requested. Program data requests will be issued and standardized procedures can be expected from this point on.

Program Data Received. Preliminary staffing plans will be furnished each year so that contract offers can be made to project faculty and graduate assistants can be recruited.

PPB Budget Completed. This includes the evaluation and changes of the budget. It will become input for the programs of the next year.

Summary

This paper has examined the management needs of WETEP. A review of the goals, environment and structure of the program has resulted in the identification of the principle management and human engineering problems which must be resolved if the program is to function effectively. The approach which will be taken to the solution of these problems has been described in broad outline. Specific answers to identified problems have not been offered; the paper instead has been directed to the development of a methodology which would provide the means of making informed decisions. To assure that the implementation of the outlined decision procedures is itself feasible, the report has presented a time frame analysis to demonstrate how the procedures would become a regular part of WETEP operation.

WETEP PERT/CPM PROCEDURES

Donald McIsaac

238/239/240

Introduction

The program development of WETEP represents a considerable undertaking. A major challenge is to develop, employ, schedule and control a myriad of activities. A Program Evaluation and Review Technique/ Critical Path Method (PERT/CPM) management system capable of channeling and condensing vast quantities of project information has been developed to meet that challenge. In Phase II ninety-seven activities falling under the jurisdiction of thirty-two individuals have been identified. In its final form the project will involve even more staff members, each with assigned tasks all delicately balanced to produce a desirable end product. The represented fields of interest and contribution will vary from the identification and development of new educational programs and techniques to the technical support systems required for implementation. PERT/CPM methodology has been successfully employed on projects of comparable scope; these procedures are expected to yield useful information throughout the continued planning and implementation of WETEP.

PERT/CPM as a tool of systems analysis is an information device. It provides meaningful and current information for the planning and implementation phases of a project. The procedure forces the project planners to commit to paper specific notions about the evolution of the plan. It provides a systematic method for documenting the progress of a set of activities. In addition, the application of the computer to the systematically collected data provides immediate information regarding the project schedule.

The application of PERT/CPM methodology to the WETEP project represents an effort to coordinate a wide scope of diverse efforts. A central part of the PERT/CPM procedure involves the systematic development of a network depicting the interrelationships of project activities. The central focus of activities around which WETEP operates is the creation of nineteen elements of teacher education. Each of the elements are identified as a systematically conceived set of modules. The identified elements and their modules constitute the main-line of activities associated with the WETEP project.

Many supportive activities are associated with the development of specific modules. For example, a specific module of the element, Science Education, might include the production of a science video tape. The planning of such a tape is a part of the module development and is the responsibility of the Science Education staff. The production of such a tape is the responsibility of the media staff. The purpose of this PERT/CPM application is to adequately monitor not only the systematic development of modules within elements but also the articulation of activities associated with the supporting services.

In order to adequately portray the application of PERT/CPM to WETEP, four major topics will be discussed. They are:

The PERT/CPM System
The PERT/CPM for Program Development of WETEP
The WETEP PERT/CPM System in Operation
The Benefits of WETEP PERT/CPM

WETEP Phase II planning has utilized the PERT/CPM methodology. Monthly and semi-monthly reports have marked the progress of the Phase II report. This WETEP PERT/CPM report illustrates the operational system by including examples of drawings from Phase II. The implementation of Phase III will follow the same general reporting procedures and output formats. The network which represents the Phase II activities appears on the next page.

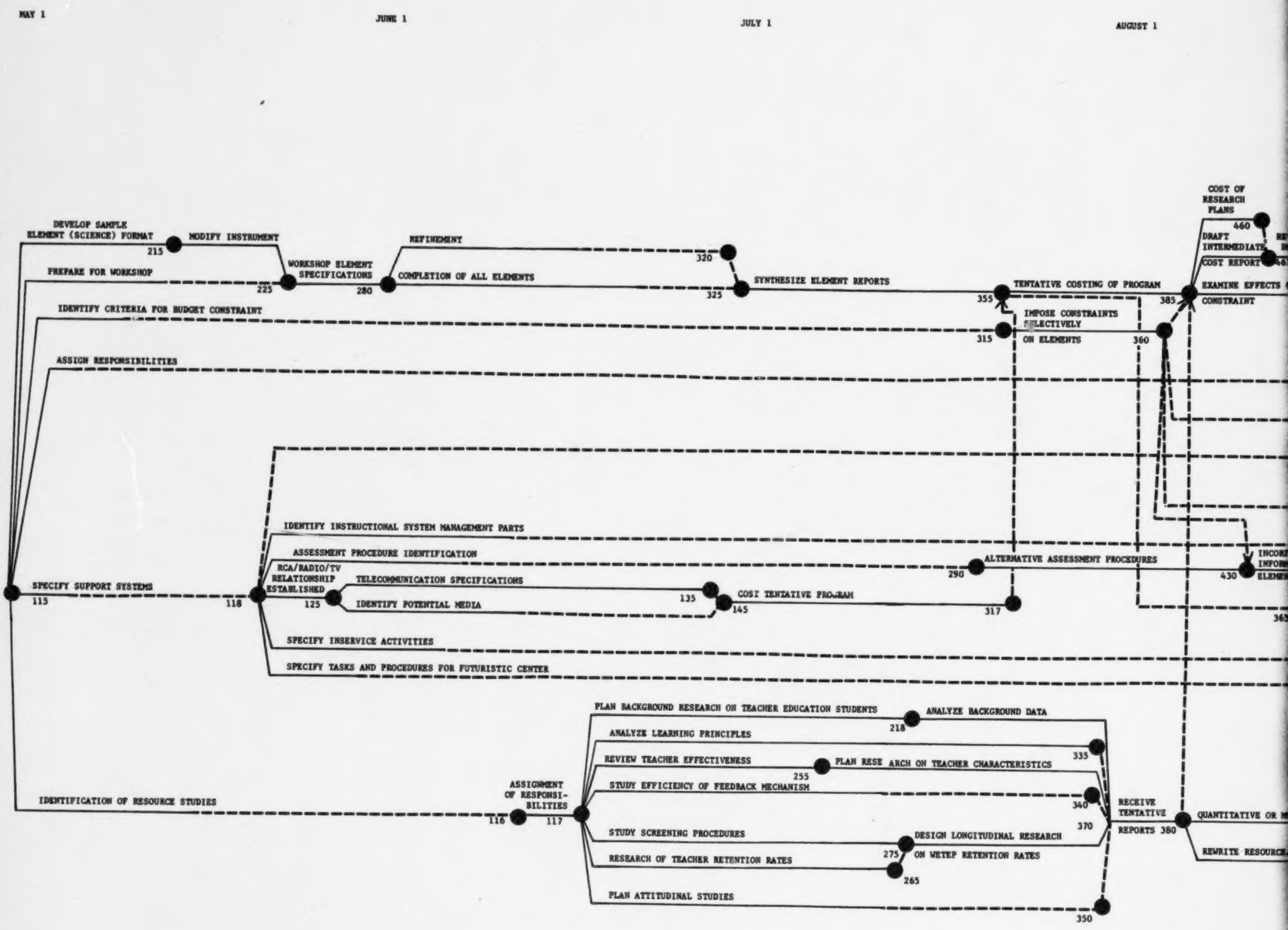
The PERT/CPM System

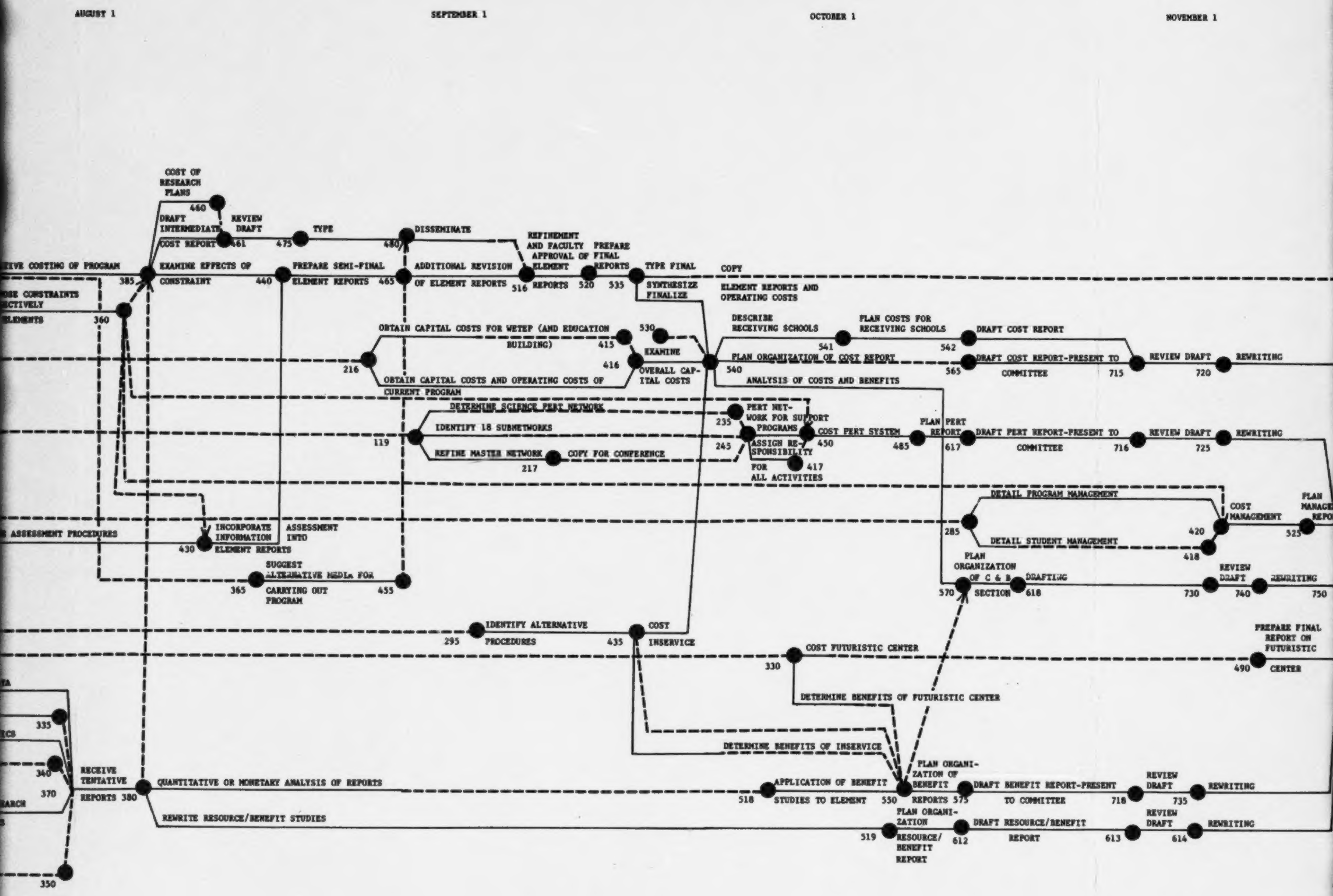
The need for rigid controls and accurate reporting procedures for massive scientific research projects has led to some highly developed methods of project management. In late 1956, James E. Kelly, Jr. of Remington Rand and Morgan Walker of E. I. duPont de Nemours began development of a planning and scheduling technique designed to facilitate the management of engineering projects. The system of analysis developed by Kelly and Morgan has come to be known as the Critical Path Method (CPM). During this same period a similar study was initiated under the direction of the Navy's Special Project Office together with the consulting firm or Booz, Allen, and Hamilton and the Lockheed Missile Systems Division. As a result, the Program Evaluation and Review Technique (PERT) was developed and implemented as a research and development project management tool in the Navy's Polaris Program. Both CPM and PERT are based upon the same assumptions, employ the same general logic, and hold the concept of critical path and the network as central.

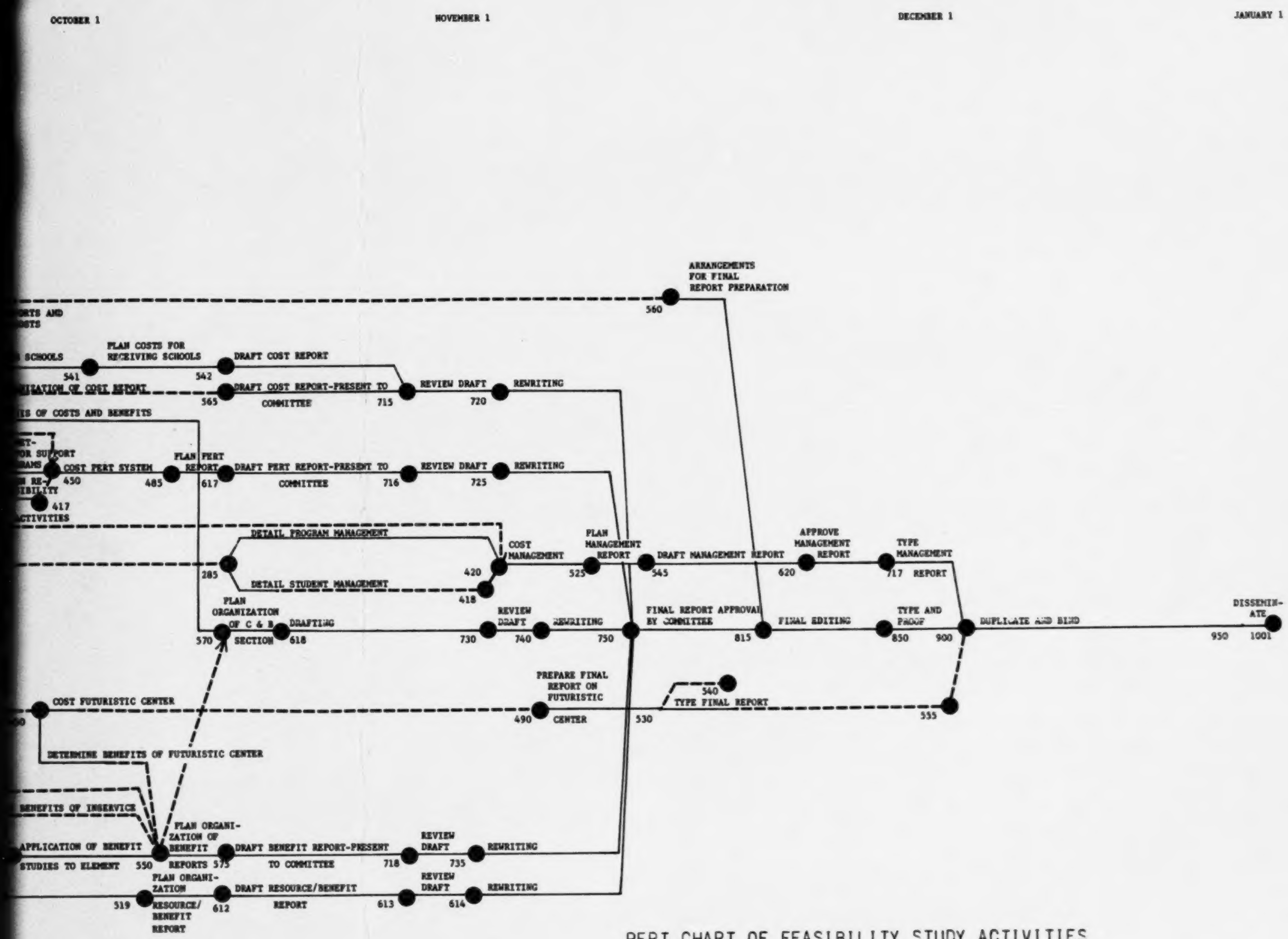
The management concepts which brought about the PERT/CPM systems for the defense industry are applicable to educational planning. Educational management, not apart from other modes of management, may be viewed as a complex blend of planning, organizing, coordinating, directing, and controlling. In order to perform these functions it is necessary to resolve the following questions:

What work is to be done?
How will the work be done?
What resources are available to perform the job?
How will the work be divided?
Who will do the work?
When will the work be done?

The usefulness of PERT/CPM lies in the facility with which it can provide answers to these question. This section relates the problems of educational management to administrative planning in an effort to enhance the opportunity for making correct, or at least more informed, educational decisions.


MAY 1
JUNE 1
JULY 1
AUGUST 1
DEVELOP SAMPLE ELEMENT (SCIENCE) FORMAT
215
MODIFY INSTRUMENT
PREPARE FOR WORKSHOP
225
WORKSHOP ELEMENT SPECIFICATIONS
280
REFINEMENT
320
COMPLETION OF ALL ELEMENTS
325
SYNTHESIZE ELEMENT REPORTS
355
TENTATIVE COSTING OF PROGRAM
385
COST OF RESEARCH PLANS
460
DRAFT INTERMEDIATE
COST REPORT
EXAMINE EFFECTS
CONSTRAINT
IDENTIFY CRITERIA FOR BUDGET CONSTRAINT
315
IMPOSE CONSTRAINTS SELECTIVELY ON ELEMENTS
360
ASSIGN RESPONSIBILITIES
IDENTIFY INSTRUCTIONAL SYSTEM MANAGEMENT PARTS
ASSESSMENT PROCEDURE IDENTIFICATION
RCA/RADIO/TV RELATIONSHIP ESTABLISHED
290
ALTERNATIVE ASSESSMENT PROCEDURES
430
INCOR INFOR ELEMEN
SPECIFY SUPPORT SYSTEMS
115
118
125
TELECOMMUNICATION SPECIFICATIONS
IDENTIFY POTENTIAL MEDIA
135
145
COST TENTATIVE PROGRAM
317
365
SPECIFY INSERVICE ACTIVITIES
SPECIFY TASKS AND PROCEDURES FOR FUTURISTIC CENTER
PLAN BACKGROUND RESEARCH ON TEACHER EDUCATION STUDENTS
218
ANALYZE BACKGROUND DATA
ANALYZE LEARNING PRINCIPLES
335
REVIEW TEACHER EFFECTIVENESS
255
PLAN RESEARCH ON TEACHER CHARACTERISTICS
STUDY EFFICIENCY OF FEEDBACK MECHANISM
340
IDENTIFICATION OF RESOURCE STUDIES
116
ASSIGNMENT OF RESPONSIBILITIES
117
RECEIVE TENTATIVE REPORTS 380
370
QUANTITATIVE OR
STUDY SCREENING PROCEDURES
DESIGN LONGITUDINAL RESEARCH ON WETEP RETENTION RATES
275
RESEARCH OF TEACHER RETENTION RATES
265
REWRITE RESOURCE
PLAN ATTITUDINAL STUDIES
350


AUGUST 1
SEPTEMBER 1
OCTOBER 1
NOVEMBER 1
COST OF RESEARCH PLANS
460
DRAFT INTERMEDIATE COST REPORT
REVIEW DRAFT
461
TYPE
475
DISSEMINATE
480
TIVE COSTING OF PROGRAM
385
EXAMINE EFFECTS OF CONSTRAINT
440
PREPARE SEMI-FINAL ELEMENT REPORTS
465
ADDITIONAL REVISION OF ELEMENT REPORTS
516
REFINEMENT AND FACULTY APPROVAL OF ELEMENT REPORTS
520
PREPARE FINAL REPORTS
535
TYPE FINAL
SYNTHESIZE FINALIZE
COPY
ELEMENT REPORTS AND OPERATING COSTS
OSE CONSTRAINTS
CTIVELY
ELEMENTS
360
OBTAIN CAPITAL COSTS FOR WETEP (AND EDUCATION BUILDING)
415
530
416
EXAMINE OVERALL CAPITAL COSTS
216
OBTAIN CAPITAL COSTS AND OPERATING COSTS OF CURRENT PROGRAM
540
DESCRIBE RECEIVING SCHOOLS
541
PLAN COSTS FOR RECEIVING SCHOOLS
542
DRAFT COST REPORT
PLAN ORGANIZATION OF COST REPORT
565
DRAFT COST REPORT-PRESENT TO COMMITTEE
715
REVIEW DRAFT
720
REWRITING
ANALYSIS OF COSTS AND BENEFITS
DETERMINE SCIENCE PERT NETWORK
119
IDENTIFY 18 SUBNETWORKS
REFINE MASTER NETWORK
217
COPY FOR CONFERENCE
235
PERT NETWORK FOR SUPPORT PROGRAMS
245
ASSIGN RESPONSIBILITY FOR ALL ACTIVITIES
417
450
COST PERT SYSTEM
485
PLAN PERT REPORT
617
DRAFT PERT REPORT-PRESENT TO COMMITTEE
716
REVIEW DRAFT
725
REWRITING
285
DETAIL PROGRAM MANAGEMENT
DETAIL STUDENT MANAGEMENT
418
420
COST MANAGEMENT
525
PLAN MANAGE
REPO
ASSESSMENT PROCEDURES
430
INCORPORATE ASSESSMENT INFORMATION INTO ELEMENT REPORTS
365
SUGGEST ALTERNATIVE MEDIA FOR CARRYING OUT PROGRAM
455
570
PLAN ORGANIZATION OF C & B SECTION
618
DRAFTING
730
REVIEW DRAFT
740
REWRITING
750
295
IDENTIFY ALTERNATIVE PROCEDURES
435
COST INSERVICE
330
COST FUTURISTIC CENTER
490
PREPARE FINAL REPORT ON FUTURISTIC CENTER
DETERMINE BENEFITS OF FUTURISTIC CENTER
DETERMINE BENEFITS OF INSERVICE
TA
335
ICS
340
370
ARCH
350
RECEIVE TENTATIVE REPORTS 380
QUANTITATIVE OR MONETARY ANALYSIS OF REPORTS
518
APPLICATION OF BENEFIT STUDIES TO ELEMENT
550
PLAN ORGANIZATION OF BENEFIT REPORTS
575
DRAFT BENEFIT REPORT-PRESENT TO COMMITTEE
718
REVIEW DRAFT
735
REWRITING
REWRITE RESOURCE/BENEFIT STUDIES
519
PLAN ORGANIZATION RESOURCE/BENEFIT REPORT
612
DRAFT RESOURCE/BENEFIT REPORT
613
REVIEW DRAFT
614
REWRITING


OCTOBER 1
NOVEMBER 1
DECEMBER 1
JANUARY 1
ARRANGEMENTS FOR FINAL REPORT PREPARATION
560
ORTS AND
OSTS
SCHOOLS
541
PLAN COSTS FOR RECEIVING SCHOOLS
542
DRAFT COST REPORT
IZATION OF COST REPORT
565
DRAFT COST REPORT-PRESENT TO COMMITTEE
715
REVIEW DRAFT
720
REWRITING
IS OF COSTS AND BENEFITS
ET-
OR SUPPORT
RAMS
COST PERT SYSTEM
450
485
PLAN PERT REPORT
617
DRAFT PERT REPORT-PRESENT TO COMMITTEE
716
REVIEW DRAFT
725
REWRITING
N RE-
IBILITY
417
CTIVITIES
DETAIL PROGRAM MANAGEMENT
285
DETAIL STUDENT MANAGEMENT
420
418
COST MANAGEMENT
PLAN MANAGEMENT REPORT
525
545
DRAFT MANAGEMENT REPORT
APPROVE MANAGEMENT REPORT
620
TYPE MANAGEMENT REPORT
717
PLAN ORGANIZATION OF C & B SECTION
570
DRAFTING
618
REVIEW DRAFT
730
740
REWRITING
750
FINAL REPORT APPROVAL BY COMMITTEE
FINAL EDITING
815
TYPE AND PROOF
850
900
DUPLICATE AND BIND
DISSEMIN-ATE
950
1001
COST FUTURISTIC CENTER
0
PREPARE FINAL REPORT ON FUTURISTIC CENTER
490
530
540
TYPE FINAL REPORT
555
DETERMINE BENEFITS OF FUTURISTIC CENTER
BENEFITS OF INSERVICE
APPLICATION OF BENEFIT STUDIES TO ELEMENT
550
PLAN ORGANIZATION OF BENEFIT REPORTS
575
DRAFT BENEFIT REPORT-PRESENT TO COMMITTEE
718
REVIEW DRAFT
735
REWRITING
519
PLAN ORGANIZATION RESOURCE/BENEFIT REPORT
612
DRAFT RESOURCE/BENEFIT REPORT
613
REVIEW DRAFT
614
REWRITING

PERT CHART OF FEASIBILITY STUDY ACTIVITIES

FOR WETEP: PHASE II

The Network

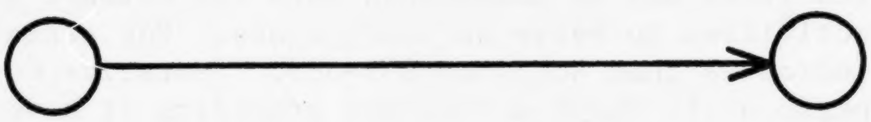
To obtain the answer to the question, "What is to be done?" is to perform the management function of planning. Basically, planning consists of posing a series of specific objectives or goals and defining their accomplishment through a succession of requisite tasks. For example, in order to implement WETEP, the primary objective, there are a series of secondary objectives which must be satisfied. In WETEP program development, the development of elements constitute such objectives. In addition, staff must be selected, new staff must be recruited, equipment must be ordered, and support programs developed. From these rather broad secondary objectives specific tasks emerge. The identification of these tasks or activities comprises the operational definition of WETEP. The identification of primary and secondary objectives and activities is central to the development of a network which graphically portrays the interrelationships of activities in terms of order and sequence.

An activity is defined as a task leading to the satisfactory completion of an objective which consumes either time or resources. In the graphic sense an activity is expressed as an arrow. The arrow is a

graphic way of indicating the occurrence of a process involving time and/or resources. The circulation of recruitment notices for new staff members might be considered an activity. An activity must be definable in time, that is to say it must have a theoretical beginning point and ending point. There must be a definable point in time before which the activity is in progress and after which it is complete. It is the violation of this central concept of activity which leads to erroneous applications of PERT/CPM techniques. For example, an action which involves the appointment of a new staff member contains a point in time before which he is not appointed and after which he is appointed.

Events are defined as points in time which signal the beginning and/or ending of activities. The symbol for an event is a circle.

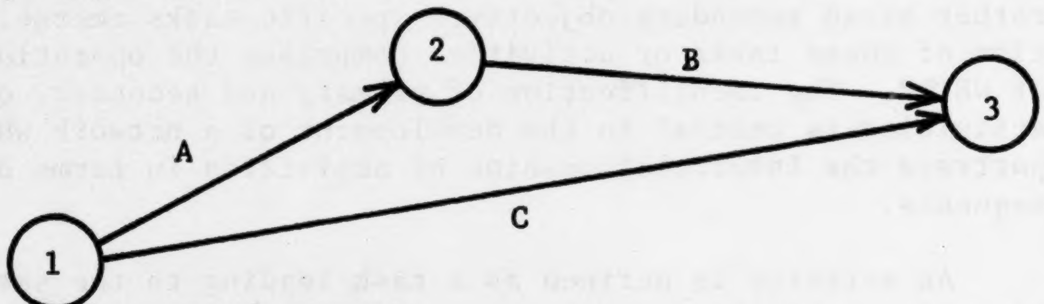
Where the activity, "Specify WETEP Support Systems", involves time and resources, the event, "Support Systems Specified", does not. An event may signal the completion of its associated activity. The graphic relationship between events and activities may be represented as:



Events, when they signal the completion of many activities, may represent the completion of a secondary objective. Thus, the completion of several tasks which constitute an objective may be signaled by a milestone or event of major importance.

Using two basic elements of a network, activities and events, it is possible to specify the sequence of activities and objectives which constitutes an entire project or program. Such specification is called a network.

A very simple network of activities is illustrated below:



This simple network means:
(1) Activities A and C may occur simultaneously; and
(2) Activity B must follow Activity A. No activity may begin until all activities leading to its preceding event have been completed. In the example, Activity B cannot be begun until Activity A is finished.

The network together with the identification of activities answers the question, "What will be done?" Each activity when identified must be associated with some description of how it is to be done, thus answering the second question of the basic planning process, "How is the work to be done?"

When developing the network it is sometimes convenient to work backwards; defining the end objective first and relating those activities which must be complete before the objective can be said to be satisfied.

After the network logic has been completed, each of the events is arbitrarily assigned a number. The event number is the identifier for a given event. Each activity has a preceding event and a succeeding event. (See the Phase II Planning Network Figure in which activities are referred to by these numbers.) For example, the specification of Support Systems is Activity 115-118. This arbitrary event identification renders the network sensitive to computer solution. The only requirement on event numbering is that each activity must have a preceding event number smaller than the succeeding event number. It is useful to assign event numbers in such a way as to permit the insertion of additional activities without destroying the smaller preceding event number rule.

Dotted lines may be introduced into the network as though they represent activities to serve as constraints. For example, dotted line 317-355 indicates that Activity 355-385, "Tentative Costing of Program", may not begin until those activities preceding it have been completed.

Constraint 317-355 consumes neither time nor resources but does preserve the notion that the tentative costing cannot begin until the activity, "Reports on Elements", is complete.

Dotted lines may also serve a slightly different purpose. Recall that each activity has an associated preceding and succeeding event. Two activities which may occur simultaneously are Development of Telecommunications Specifications and Potential Media. Both of these activities begin with event 125 and logically end with event 145. If both activities were so designated there would be two identically numbered activities 125-145. In order to avoid this confusion it is necessary to include a dummy activity 135-145 and force a small triangle. Thus, three activities are given: 125-135, 125-145, and the dummy activity 135-145.

In the development of large and comprehensive networks it is essential to identify the primary objective and secondary objectives first. The fragnet presented above might represent the activities heading to the completion of one secondary objective in a larger network.* In this way network development may be conceived as a building process. First it is necessary to develop an outline of the primary objective in terms of secondary objectives. Second, one defines the secondary objectives in terms of activities or specific tasks. The primary objective of WETEP is the Total Educational Program. The secondary objectives include the Elements and The Support Programs. Fragnets for each of the secondary objectives must be established in order to create a comprehensive and detailed network. Each of the separate fragnets is then placed into a larger network illustrating the planning for an entire project.

Management realizes some unique advantages in systematizing the sequence of activities. A clear plan is established. The process of contructing a network is difficult because interrelationship of activities must be explicitly defined. The nature of each activity must be made clear and its contribution to the project becomes obvious. Network construction may be considered to be an end, but in reality it provides the basis for a beginning. The network is sensitive to computer technology and may be solved. The detailed steps of network solution will not be discussed in this report. The WETEP Network will be coded for computer consumption. Each of the WETEP activities will be coded according to preceding event, succeeding event, responsibility assignment and estimated duration. The initial run provides a basis for updating the network and estimated durations throughout the WETEP duration. Reports such as those illustrated in Part III of this report will be produced on a periodic basis.

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*Activity No. 115-1001 in WETEP Proposal.

The computer program package for implementing critical path solutions contains two major programs. The first phase of this program handles the input data describing the project structure. The second phase contains the algorithm which generates the WETEP schedule and places it on a binary tape, IBIT, for future editing. The third phase provides a wide variety of publishing options and writes a binary tape of activities to be sorted for the responsibility listings. The second program uses the information provided on the binary tape, converts the days to calendar dates, and provides the sorted lists. Specifications of the two programs are presented here.

Program 1 (PERT)

Input Data: There are five parts of input data to be considered for this program. The first card contains an I9SW parameter punched in the fifth column. It sets a variable in the program equal to some value between 1 and 5. This variable defines four possible computer runs. The program options are defined here in terms of the proposed WETEP reports.

I9SW = 2 Generates WETEP schedule.

Title Cards: The second part of the data consists of four cards containing project descriptions which ultimately serve as title information for schedule printouts.

Card 1 = Start of update run (Col. 1, 12)

Card 2 = Wisconsin - School of Education (free format, Col. 1-36)

Card 3 = WETEP (free format, Col. 1-72)

Card 4 = Days (Col. 1-8)

LL Activity Cards

The third part of the input data consists of LL Activity Cards, followed by a trailer card with a negative non-zero punched in Col. 6-10. The activity cards are read according to the following fixed format. (2I5, 1X, A2, 3A8, A3, A8, F5.0, F10.0, F5.0, F10.0, F2.0)

Activity Card Description

Field	Col.	Description
1	1-5	Preceding event number
2	6-10	Succeeding event number must be larger than preceding event
3	12-13	Responsibility code--may be alphabetic
4	14-40	Activity description
5	41	Activity status code: S = scheduled I = in progress C = completed; if blank an S is assumed
6	42-48	Schedules completion date--for information
7	49-53	Normal activity time. A decimal is assumed between Col. 52 and 53. Do not punch the decimal point.
8	46-55 (XA2)	Normal activity time. A decimal is assumed between Col. 62 and 63. Do not punch the decimal point.
9	64-68	Crash activity time. The decimal is assumed between Col. 67 and 68. Do not punch the decimal point.
10	69-78	Crash activity cost. A decimal is assumed between Col. 77 and 78. Do not punch the decimal point.
11	78-80	A non-zero integer in this field causes the activity to be set to either crash or normal values but at no point in between.

When the activity cards are prepared they must be sorted on Col. 6-10 within Col. 1-5. A negative integer in Col. 6-10 must follow the activity deck and signal its end.

N. Event Cards

The fourth part of the input data consists of N event cards. It may be desirable to list the events with the appropriate descriptions so that complexities of the network may be more easily seen. One event card is required for each event in the network.

Field	Col.	
1	6-10	Event number
2	12-71	Event description - free format

The N event cards must be sorted in ascending sequence on Col. 6-10. Also there must be a trailer card with a negative integer in Col. 6-10.

Parameter Card

The fifth part of the input data consists of one card containing parameters which specify what schedules are to be printed from the IBIT binary tape.

Field	Col.	
1 (IC)	1- 5	1 = Responsibility tape listing on logical 7
	6-10 (IDEC)	6 = Output produced on printer
	11-15 (KE)	1 = Print WETEP schedule
	16-20 (KD)	1 = Print WETEP schedule

The Logical Unit assignments are as follows:

Input on Logical Unit 5

Output on Logical Unit 6

IBIT Tape on Logical Unit 3

Responsibility Tape on Logical Unit 7

Program 2 (PERTSORT)

This program reads the list of activities placed on Logical Unit 7 and provides lists of sorted on two key fields.

1. Responsibility List
   Activities are sorted according to assigned responsibility and the complete list for a unique responsibility code is placed on separate pages.
2. Activity List by Total Float
   Activities are sorted on Total Float within Early Start. The

entire project is portrayed from beginning to end in the order of occurence. Activities scheduled to being on the same day they are listed in order of criticality.

The scheduled dates may be converted to calendar days. It is therefore necessary to provide information in addition to that contained on the Responsibility Tape.

These data include:

Card	Col.	
1	1 (IDT)	= 0 Listing will contain the number of days beyond the first day
		= 1 Start and finish days will be converted to calendar days
		= The beginning day of the week for the published calendar

Card Col.

1 = Sunday

2 = Monday

3 = Tuesday

4 = Wednesday

5 = Thursday

6 = Friday

7 = Saturday

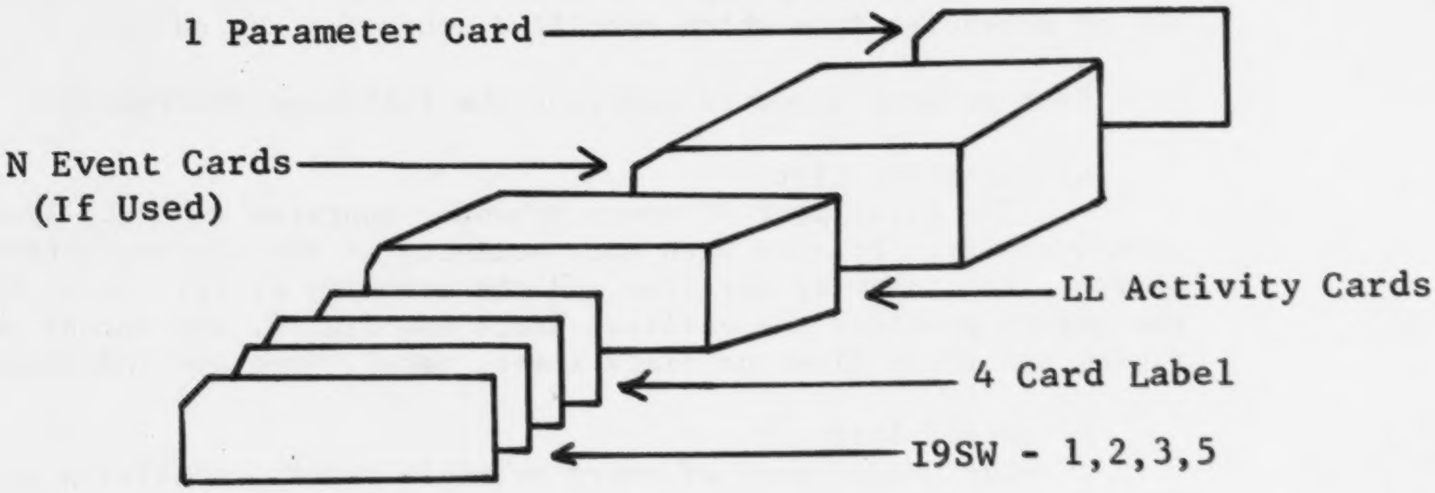
Saturday and Sunday are automatically eliminated from the published list. The calendar represents only Monday-Friday as working days.

The calendar will accomodate approximately four and one-half years or 1200 working days.

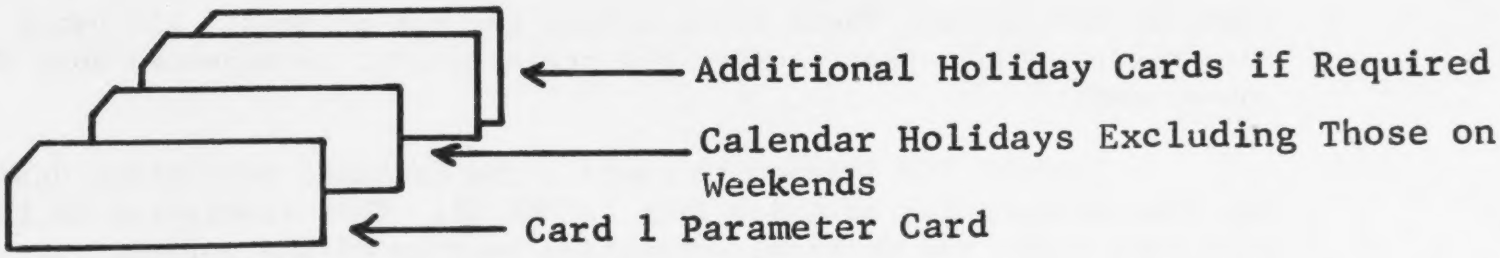
Card	Col.	
	3-4	Month of the starting day
	5-6	Day of the month of the starting day
	7-8	Year of the starting day

Card	Col.	
2		Not used unless calendar conversion desired
	1-2	Number of holidays excluding those which fall on Saturday or Sunday
	3-4	Month of first holiday
	5-6	Day of first holiday
	7-8	Year of first holiday
	9-10	Month of second holiday
	11-12	Day of second holiday
		"
		"
		"
		13 holidays/card Up to 50 holidays to be excluded

Figure 1 shows the card sequence order for the two programs PERT/CPM and PERTSORT.


1 Parameter Card
N Event Cards
(If Used)
LL Activity Cards
4 Card Label
I9SW - 1,2,3,5

PERT/CPM


Additional Holiday Cards if Required
Calendar Holidays Excluding Those on Weekends
Card 1 Parameter Card

PERTSORT

FIGURE 1

CARD INPUT ORDER FOR PERT PROGRAMS

Program Output

The output subroutine is designed to extract WETEP schedule information from the binary tape "IBIT". This tape normally contains a number of schedules from which specified schedules are edited.

Each printed schedule contains the following information:

a) Activity list

The first part of every schedule contains a detail line for each activity. Printed with each activity is the minimum schedule information: the activity duration and the activity direct cost. In addition the report provides the earliest start and finish, the latest start and finish and three float or slack times, total, free and independent.

b) Event list

The second part of every schedule report contains a detailed line for each activity. Printed with each event is the earliest and latest occurrence time. The description will contain all information provided on the list of event cards. If the event cards are eliminated by virtue of the NLIST generator indicated on the selection card, the event list will be generated and published, but of course, the descriptions will be blank.

c) Critical activities

The third part of every schedule report contains a detail line for each critical activity. Since such activities have a zero float time, by definition, their float values are not printed. All other information which appears under the activity list is repeated here for convenience.

Logical ICP is used to compile the critical activities during the computations for activity list, (CODE 4). This compilation is then published under the Critical Activities section of the output.

d) Activities listed by responsibility

The PERTSORT program, if used, publishes a list of activities sorted according to the responsibility code.

e) If PERTSORT is employed all of the activities will be published in order of their earliest start dates.

The PERT/CPM System for Program Development of WETEP

The WETEP development required successful completion of a series of primary activities. The development of each of the nineteen elements of the WETEP program may be conveniently viewed as an activity shown in a general network. Figure 2 represents a general plan for WETEP development. It provides, in outline form, a clear picture of required development activities. It reflects a five-year progression for each of the nineteen elements. The generalized network obviously does not serve any operational purpose. It lacks specificity. Each

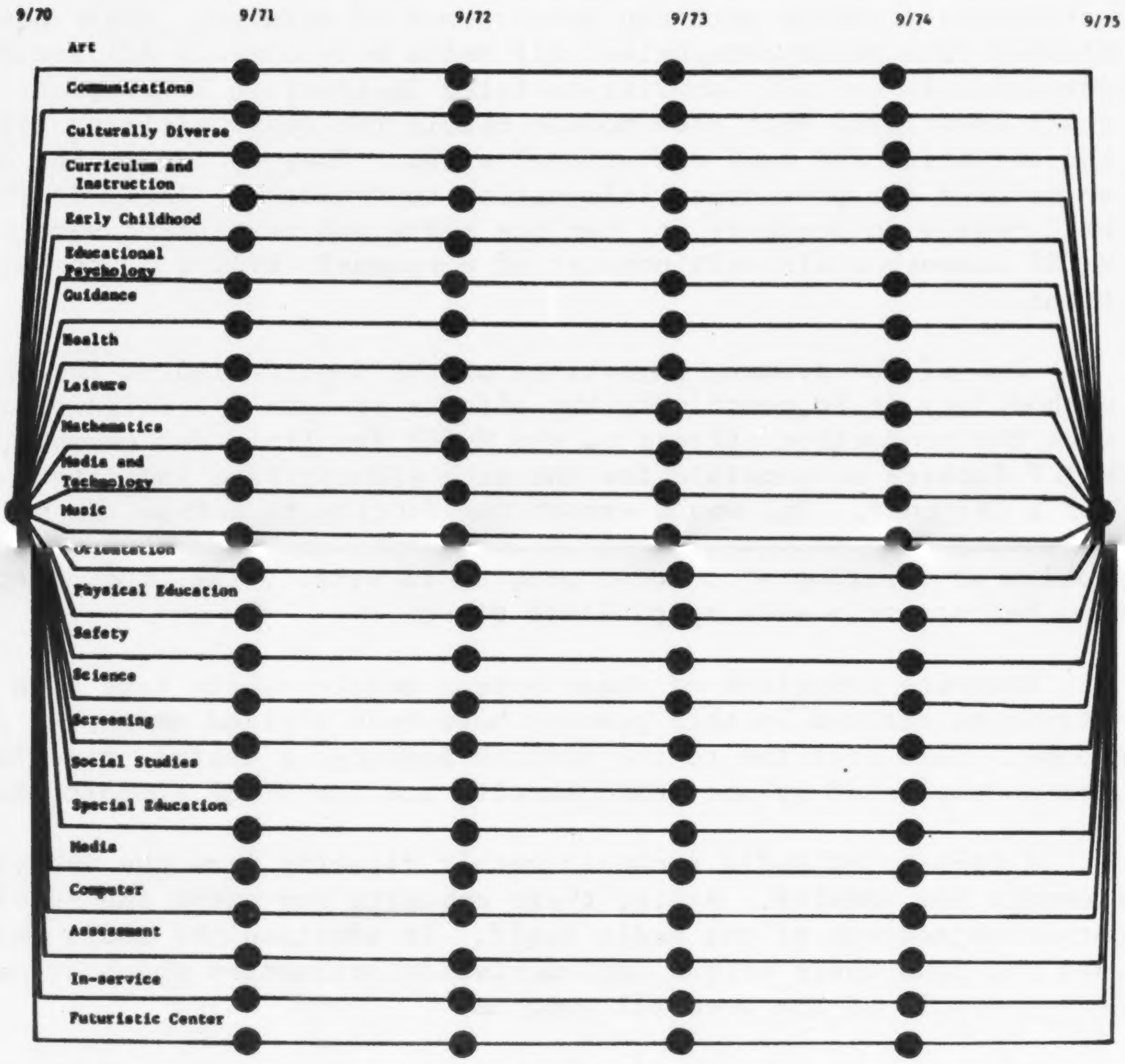

9/70
9/71
9/72
9/73
9/74
9/75
Art
Communications
Culturally Diverse
Curriculum and Instruction
Early Childhood
Educational Psychology
Guidance
Health
Leisure
Mathematics
Media and Technology
Music
Orientation
Physical Education
Safety
Science
Screening
Social Studies
Special Education
Media
Computer
Assessment
In-service
Futuristic Center

FIGURE 2

THE FIVE YEAR WETEP NETWORK
ILLUSTRATION OF PRIMARY OBJECTIVES

element contains a number of modules which are not shown on the figure. The task or responsibility level is not sufficiently narrow to provide useful information.

Each of the elements has been isolated and defined in terms of its unique modules. The final network follows the basic pattern of the general network with each of the activities replaced by fragnets.*

Supportive activities are required in addition to those activities associated directly with the development of modules. These have been divided into three categories: (1) Media Development; (2) Assessment Development; and (3) Computer-Assisted Instruction Development. The staff associated with each module retain the responsibility for stating the objective for each educational event. They decide on the method or methods for presenting information to students. Their deliberations will result in requests for various media and assessment needs. The WETEP support staff will consist of personnel skilled in these applications.

One of the primary objectives of the application of the PERT/CPM methodology is to coordinate the efforts of this specialized staff with the production efforts of the WETEP faculty. For example, the WETEP faculty responsible for the math element have indicated a need for a CAI unit. One would expect the faculty to define the unit and to specify its content so that it fits into the element design. The problem of creating a computer program to satisfy the program specification belongs to a more specialized group.

Fragnets comprised of these unique module events have been developed. Activities derived by this process have been divided among the supportive groups. This addition to the network provides a useful articulation of work accomplished by the WETEP faculty and the WETEP support staff.

A variety of media requests result directly from the individual elements and modules. Again, these requests represent the specific output objectives of the media staff. In addition the media personnel must set down their unique implementation activities which are an indirect result of the over-all program.

The media support staff will be expected to produce film strips, 16 mm films, video tapes and the like. All of these will be created according to the educational specifications set down by the various WETEP element groups.

In order to satisfy the request over a five year period, the media staff will require laboratory facilities and staff personnel capable of handling the photographic requirements of the program. They will need studio facilities and staff sufficient in size and talent to handle the audio-visual requirements of the program.

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*Available from WETEP Office, School of Education, University of Wisconsin.

A fragnet accommodating the WETEP Faculty requests and the organizational tasks of the media staff has been developed. This media fragnet is an effort to coordinate the important contribution of media staff with the rest of the WETEP program.

Each module and its associated development tasks are identified with one responsible individual. Table I lists those responsibility assignments. Regular computer publications regarding the progress of the WETEP program will be forwarded to those listed. Activities will be coded with regard to responsibility and separate listings will be provided according to responsibility code. These reports will focus attention on those activities falling under the jurisdiction of module chairmen. Regular reports offer a dynamic method of reporting progress to all participants of WETEP. Each report will consist of the complete network solution in addition to individual responsibility listings. The reports will provide information regarding general progress of the entire project demonstrating for individuals their importance to the project. The responsibility listings provide a specific reporting isolating those activities assigned to one individual.

Page 243 contains the network for the general specification of the total WETEP development period. Each of the fragnets mentioned in this chapter appears in summary in a supplementary document, "The WETEP Network".* The fragnets in this document are identified and keyed to the general network in an effort to maintain a clear picture of the total effort. The size of this supportive document precluded its total appearance in this report. Illustrative fragnets are shown in Figures 3 and 4. Approximately 200 pages of Network illustrations have been compiled. They provide the basis for implementing WETEP Phase III.

The WETEP PERT/CPM System in Operation

The PERT/CPM techniques described in the preceeding pages of this report reflect a relatively static operation. The definition of the initial network demonstrates a plan. It is a map of the activities to be accomplished and accordingly it reflects an itinerary of objectives. Any planned procedure encounters necessary detours and any worthwhile plan includes a strategy for the unexpected. The operational PERT/CPM is such a strategy.

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*Available from WETEP Office, School of Education, University of Wisconsin

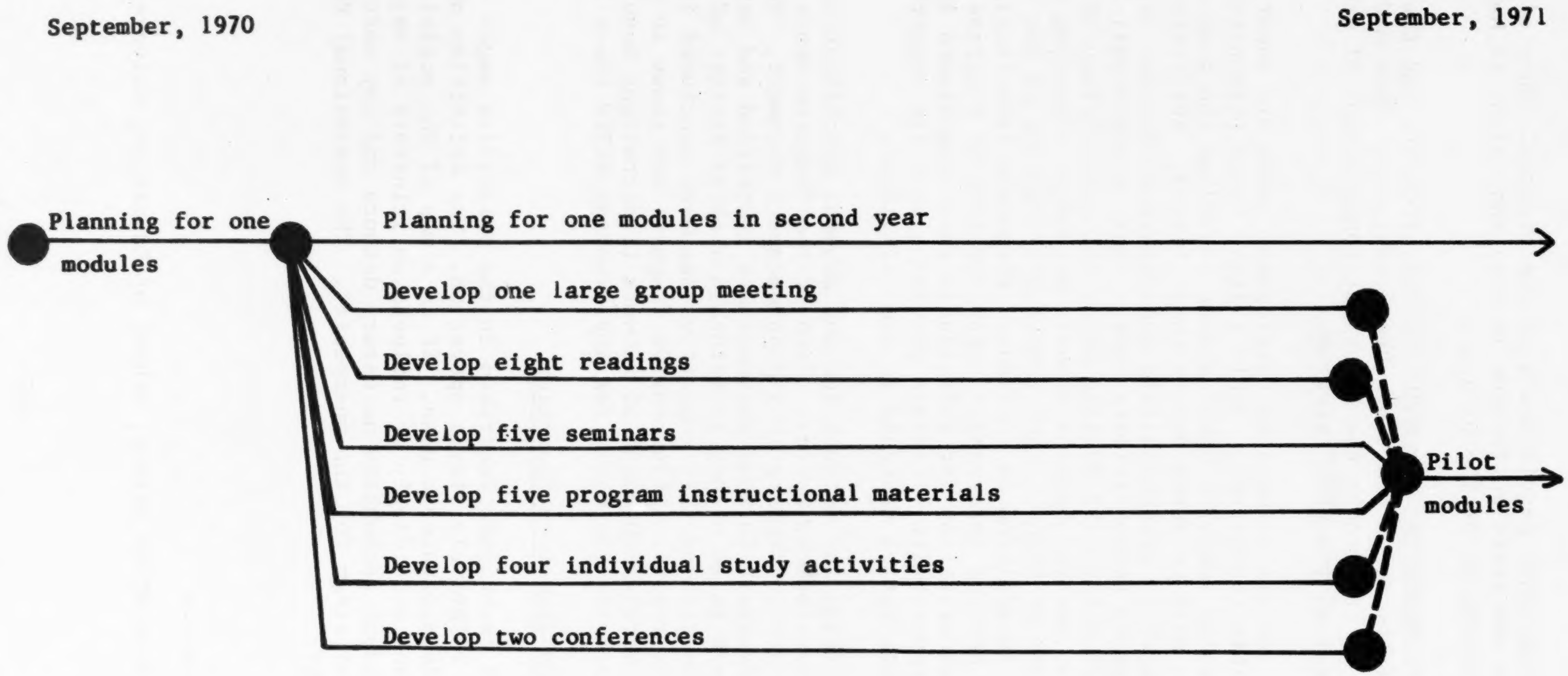
September, 1970
September, 1971
Planning for one modules
Planning for one modules in second year
Develop one large group meeting
Develop eight readings
Develop five seminars
Develop five program instructional materials
Develop four individual study activities
Develop two conferences
Pilot modules

FIGURE 3

PERT CHART - MATH STAFF ACTIVITIES FOR YEAR ONE
A SAMPLE ELEMENT FRAGNET

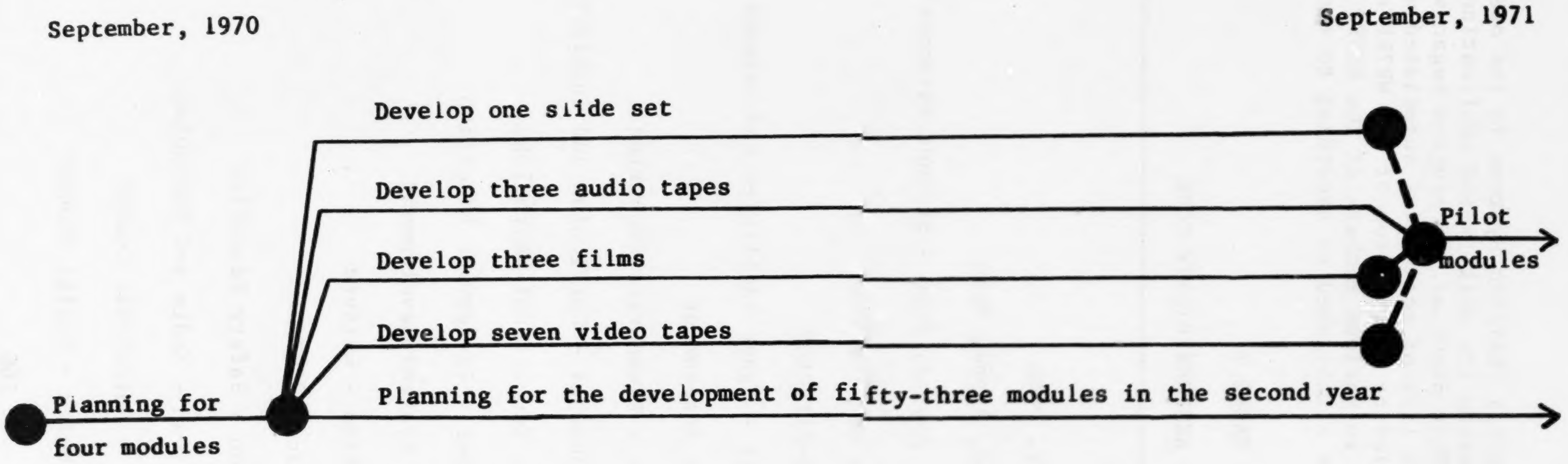
September, 1970
September, 1971
Develop one slide set
Develop three audio tapes
Develop three films
Develop seven video tapes
Planning for the development of fifty-three modules in the second year
Planning for
four modules
Pilot
modules

FIGURE 4

PERT CHART - MEDIA ACTIVITIES FOR YEAR ONE
A SAMPLE SUPPORT FRAGNET

In order to describe the total PERT/CPM Systems in its operational mode, it will be useful to describe its utility and application to the Phase II planning operation. This phase of the program began with the funding of a planning phase. A list of activities associated with the planning of WETEP were identified by a committee of the WETEP staff. These activities were assigned to various members of the WETEP staff. The staff code assignments were established as according to the following table.

TABLE I

WETEP STAFF RESPONSIBILITY CODE

Code	Name
1	Donald J. McCarty, Dean
3	Robert G. Petzold, Assoc. Dean
5	Dan W. Andersen, Assist. Dean - Student Personnel
7	M. Vere DeVault, Co-Director
9	John M. Kean, Co-Director
12	Thomas C. Barrett - Space Facilities and Research
14	T. Anne Cleary - Assessment
18	Carl R. Personke - Elementary Education
20	Theodore J. Czajkowski - Curriculum and Instruction
23	Robert Grinder - Educational Psychology
25	Margaret P. Ammons - In-service Education
27	Albert H. Yee - Systems Development
28	H. Clifton Hutchins - Leisure
29	Donald N. McIsaac - PERT/CPM
31	C. Frazier Damron - Safety Education
32	Charles D. Sullivan - Media and Technology
34	Fred M. Newmann - Futuristic Center
37	B. Robert Tabachnick - Social Studies

Code	Name
39	Calvin W. Gale - Science
41	Ronald Neperud - Art
43	Warren Southworth - Health
45	Virginia Chambers - Music
47	J. Fred Weaver - Mathematics
49	David C. Davis - Early Childhood
51	James Billingsley - Special Education
53	Marie Mullan - Physical Education
55	Philip Perrone - Guidance
58	John Antes - Culturally Deprived
60	Donald Lange - Clinical Experience
63	Mary A. Golladay - Economic Analysis
65	LeRoy J. Peterson - Cost Analysis
71	Architect
73	Wilson Thiede - Building Committee
75	Construction

The activities, once identified and assigned, were grouped in a network specifying the interrelationships of activities. An estimated duration was projected for each activity and the results coded into machine readable cards. The information was processed on the University of Wisconsin Computing Center's (UWCC) CDC 3600 Computer. The program was a standard PERT/CPM solution developed by Donald N. McIsaac of the Department of Educational Administration. The initial solution information indicated that April 15, 1970 would be the completion date of the Phase II planning. The WETEP staff then re-evaluated the estimated duration so that a more desirable January 1, 1970 estimate was possible.

The initial PERT report describing Phase II activities contained three parts:

1. Activity list
   Solution of the network presenting the list of activities in

network sequence including earliest start and finish, latest start and finish, and slack time estimates for each activity.

2. Event list
   Solution of the network expressing the earliest and latest occurence for each event.

3. Critical activities
   A list of those activities having zero slack time.

This report contained information regarding the schedule of activities, description of the activities, and responsibility code. All scheduled estimates were expressed in days beyond the beginning day of the project. The 134 activities were scheduled into the 171 working days between May 1, 1969 and January 1, 1970. A major Phase II objective included meeting a scheduled January 1, 1970 report completion date.

After May 1, 1969, it was necessary to update and re-evaluate the progress of the planning. Each month saw the production of an updated network and its subsequent computer report. Each report served as a basis for subsequent reports. In addition to the three types of output mentioned above, each monthly publication included two additional elements of information.

4. Activity list by responsibility
   All activities are sorted into separate responsibility lists and the computed schedule converted to appropriate calendar dates.

5. Responsibility list by total float
   The activities of the entire project are sorted by total float within earliest start. This list is useful for overall project management.

These five reports were produced each month until October when bi-weekly reports were produced and distributed to the WETEP staff. Duplicate copies of the Responsibility List were distributed. Each member of the WETEP staff reviewed his own activities and noted their status. This information was reflected in the following monthly report.

An annotated copy of the October 15, 1969 Report on the Phase II planning is contained in the appendix. This sample is representative of other published monthly reports.

Network of Activities

The PERT chart on page 243 is a network expression of those activities which make up the Phase II planning. They are expressed in a network for convenience of presentation. The network was developed according to the principles expressed in Part I of this document.

The network graphically depicts the information provided in the pages which follow. Each activity on the network may be identified by its preceding and succeeding event number. No activity on the network may begin until all activities leading to the preceding event have been completed.

Activity List

The following report is an example of the computer produced network solution of the Phase II planning. The report includes a title together with general information about the activity and event counts.

The column headings of the following pages are described in the following manner. This illustration of the Phase II planning report is included to clarify the proposed Phase III procedures.

Prec. Event - This number represents the preceding event taken from the Activity Network.

Succ. Event - Thus number represents the succeeding event taken from the Activity Network.

Res. CDE - This column is the Responsibility Code and is drawn from a coded list of WETEP staff having responsibility for specific activities. It is a column of information used in a Sorted Listing. It may be alphanumeric.

Description - This field represents descriptive information about the specific activity.

C S - This column is reserved for the status of the activity
C - Complete
I - In progress
S - Scheduled
This information is the most often updated on monthly runs.

Date Comp. - This field is an information field reflecting on expected completion date.

Duration - Is the estimated duration of the activity in days.

Dived Cost - The cost of the activity. This feature is not used in this analysis as it falls into the realm of the cost analysis committee. It would be a redundant piece of data.

Earliest Start - That day beyond the beginning of the project on which this activity may begin

Earliest Finish - That day beyond the beginning of the project on which the activity may be completed if initiated at the earliest start.

Late Start - The latest day beyond the beginning of the project that the activity may begin and not delay the completion of the project.

Late Finish - That day beyond the beginning of the project on which the activity must be completed. Any delay beyond this date will theoretically delay the project completion.

Float Total - Same as total slack. The number of days beyond the earliest start an activity may be delayed and not delay the project completion. Preceding activities may consume this slack time.

Float Free - The number of days beyond the earliest start an activity may be delayed and not delay the next activity. Preceding activities may consume this slack time.

Float Indep. - The number of days beyond the earliest start an activity may be delayed and not delay the next activity.

```
                                           A C T I V I T Y   L I S T                                                      PAGE    1
                                                      NOV 1, 1969
DISTRICT - WETEP PROJECT
PROJECT TITLE - PERT ANALYSIS OF WETEP  -  PHASE II

TIME UNIT - DAYS                                                                      SCHEDULE                0
COST UNIT - NADA                                                                      DIRECT COST           0.0
                                                                                      DURATION            171.0
ACTIVITY COUNT -  134
EVENT COUNT -      95


                                                                         DIRECT     EARLIEST          LATEST                    FLOAT
. PREC. SUCC. RES                               C   DATE                                                                          
 EVENT EVENT CDE   DESCRIPTION                  S   COMP    DURATION   COST    START - FINISH   START - FINISH   TOTAL    FREE     INDEP.

  115   11-   9   IDENTN OF RESOURCE STUDIES     C            10.0        0.0     0.0    10.0     20.0    30.0    20.0     0.0      0.0
  115   11-   7   SPECIFY SUPPORT SYSTEMS        C             3.0        0.0     0.0     3.0     11.0    14.0    11.0     0.0      0.0
  115   21-   7   DEV SAMP ELE (SCI) FORMAT      C            10.0        0.0     0.0    10.0      0.0    10.0     0.0     0.0      0.0
  115   21-   7   ASSIGN RESPONSIBILITIES        C             2.0        0.0     0.0     2.0     79.0    81.0    79.0     0.0      0.0
  115   22-   7   PREPARE FOR WORKSHOP           C             0.0        0.0     0.0     0.0     15.0    15.0    15.0    15.0     15.0
  115   31-   7   IDENT CRITERIA F BUGT CONST    C             5.0        0.0     0.0     5.0     52.0    57.0    52.0     0.0      0.0
  116   117   9   ASSIGNMT OF RESPONSIBILITS     C             2.0        0.0    10.0    12.0     30.0    32.0    20.0     0.0      0.0
  117   21-   9   PLAN BCKGRND RES ON TCHR ED    C            15.0        0.0    12.0    27.0     36.0    51.0    24.0     0.0      0.0
  117   25-   9   REVIEW TEACHER EFFECTIVENES    C            15.0        0.0    12.0    27.0     32.0    47.0    20.0     0.0      0.0
  117   26-   5   RES OF TCHR RETENTION RATES    C            15.0        0.0    12.0    27.0     37.0    52.0    25.0     0.0      0.0
  117   27-   5   STDY SCREENING PROCEDURES      C            20.0        0.0    12.0    32.0     32.0    52.0    20.0     0.0      0.0
  117   33-   9   ANALYZE LEARNING PRINCIPLES    C            30.0        0.0    12.0    42.0     32.0    62.0    20.0     0.0      0.0
  117   35    5   PLAN ATTITUDINAL STUDIES       C            15.0        0.0    12.0    27.0     47.0    62.0    35.0     0.0      0.0
  117   61-   7   STDY EFFIC OF FEEDBCK MECH     I            15.0        0.0    12.0    27.0    100.0   115.0    88.0     8.0      0.0
  118   11-   0   DUMMY                          C             0.0        0.0     3.0     3.0     83.0    83.0    80.0     0.0      0.0
  118   12-   7   RCA/RADIO/TV RELNSHP ESTAB     C             3.0        0.0     3.0     6.0     14.0    17.0    11.0     0.0      0.0
  118   28-   7   IDENT INSTRL SYSTEM MANAGMT    C            10.0        0.0     3.0    13.0    105.0   115.0   102.0     0.0      0.0
  118   29   14   ASSESSMNT PROCUR IDENT         C            15.0        0.0     3.0    18.0     41.0    56.0    38.0     0.0      0.0
  118   29-  25   SPEC INSERVICE ACTIVITIES      C            10.0        0.0     3.0    13.0     77.0    87.0    74.0     0.0      0.0
  118   33    9   SPEC TSKS/PROCUR F FUTHC C-    C             5.0        0.0     3.0     8.0    103.0   108.0   100.0     0.0      0.0
  119   217  29   REFINE MASTER NETWORK          C            14.0        0.0     3.0    17.0     83.0    97.0    80.0     0.0      0.0
  119   23-  29   DETMN SCIENCE PERT NETWORK     C             1.0        0.0     3.0     4.0    101.0   102.0    98.0     0.0      0.0
  119   31-  29   IDENTIFY IF SUBNETWORKS        C             5.0        0.0     3.0     8.0     97.0   102.0    94.0    14.0      0.0
  125   135  32   TELECOMMUNICATN SPECIFICATN    I            25.0        0.0     6.0    31.0     17.0    42.0    11.0     0.0      0.0
  125   145  32   IDENTIFY POTENTIAL MEDIA       C            15.0        0.0     6.0    21.0     27.0    42.0    21.0    10.0      0.0
  135   145   0   DUMMY                                        0.0        0.0    31.0    31.0     42.0    42.0    11.0     0.0      0.0
  145   317  32   COST TENTATIVE PROGRAM                      15.0        0.0    31.0    46.0     42.0    57.0    11.0     0.0      0.0
  215   22-   7   MODIFY INSTRUMENT              C             5.0        0.0    10.0    15.0     10.0    15.0     0.0     0.0      0.0
  216   415  65   OB CAPTL CST F WETEP/ED BLD    C             5.0        0.0     2.0     7.0     91.0    96.0    89.0     0.0      0.0
  216   41-  63   OB CPTL CST/OP CST O CUR PR    C            15.0        0.0     2.0    17.0     81.0    96.0    79.0     0.0      0.0
  217   24-   7   COPY FOR CONFERENCE            C             5.0        0.0    17.0    22.0     97.0   102.0    80.0     0.0      0.0
  218   37    9   ANALYZE BACKGROUND DATA        C            11.0        0.0    27.0    38.0     51.0    62.0    24.0     4.0      0.0
  225   28    7   WORKSHOP ELEMENT SPECIFICA-    C             7.0        0.0    15.0    22.0     15.0    22.0     0.0     0.0      0.0
  235   31-   0   DUMMY                          C             0.0        0.0     4.0     4.0    102.0   102.0    98.0    18.0      0.0
  245   315   0   DUMMY                          S             0.0        0.0    22.0    22.0    102.0   102.0    80.0     0.0      0.0
  255   37    9   PLN RES ON TCHR CHARACTERCS    C            15.0        0.0    27.0    42.0     47.0    62.0    20.0     0.0      0.0
  265   275   0   DUMMY                          S             0.0        0.0    27.0    27.0     52.0    52.0    25.0     5.0      0.0
  275   37    5   DSN LNGNL RES WETEP RT, HAT    C            10.0        0.0    32.0    42.0     52.0    62.0    20.0     0.0      0.0
  280   32    7   REFINEMENT                     C            10.0        0.0    22.0    32.0     32.0    42.0    10.0     0.0      0.0
  280   325   7   COMPLETION OF ALL ELEMENTS     C            20.0        0.0    22.0    42.0     22.0    42.0     0.0     0.0      0.0
  285   41-   7   DETAIL STUDENT MANAGEMENT      I             2.0        0.0    13.0    15.0    128.0   130.0   115.0     0.0      0.0
```

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                                                A C T I V I T Y   L I S T                                       PAGE    2

PREC. SUCC. RES                                   C   DATE                   DIRECT    EARLIEST          LATEST                      FLOAT
EVENT EVENT CUE   DESCRIPTION                     S   COMP      DURATION     COST   START - FINISH   START - FINISH    TOTAL      FREE      INDEP.

  285    42   7  DETAIL PROGRAM MANAGEMENT        I               15.0        0.0    13.0    28.0    115.0   130.0     102.0       0.0       0.0
  290    43  14  ALTRNATIVE ASSMNT PROCEDURES     I               15.0        0.0    18.0    33.0     56.0    71.0      38.0       0.0       0.0
  295   435  25  IDENT ALTERNATIVE PROCEDURS      I               10.0        0.0    13.0    23.0     87.0    97.0      74.0       0.0       0.0
  315    36   7  IMPZ CONSTRNT SELCTVL ON EL      C               10.0        0.0     5.0    15.0     57.0    67.0      52.0       0.0       0.0
  316   417  29  ASSGN RESP SBLTS FR ALL ACT      C                1.0        0.0    22.0    23.0    106.0   107.0      84.0       0.0       0.0
  316    45  29  PERT NTWRK F SUPPORT PROGRM      I                5.0        0.0    22.0    27.0    102.0   107.0      80.0       0.0       0.0
  317   355   0  DUMMY                            S                0.0        0.0    46.0    46.0     57.0    57.0      11.0      11.0       0.0
  320   325   0  DUMMY                            C                0.0        0.0    32.0    32.0     42.0    42.0      10.0      10.0       0.0
  325   355   7  SYNTHESIZE ELEMENT REPORTS       C               15.0        0.0    42.0    57.0     42.0    57.0       0.0       0.0       0.0
  330    49   9  COST FUTURISTIC CENTER           I                2.0        0.0     8.0    10.0    131.0   133.0     123.0       0.0       0.0
  330    55   9  DTRN BENFT OF FTRISTC CNTR       I                4.0        0.0     8.0    12.0    108.0   112.0     100.0      58.0       0.0
  335    37   0  DUMMY                            S                0.0        0.0    42.0    42.0     62.0    62.0      20.0       0.0       0.0
  350    37   0  DUMMY                            S                0.0        0.0    27.0    27.0     62.0    62.0      35.0      15.0       0.0
  355   365   0  DUMMY                            S                0.0        0.0    57.0    57.0     73.0    73.0      16.0       0.0       0.0
  355   375   7  TENTATIVE CSTG OF PROGRAM        C               10.0        0.0    57.0    67.0     57.0    67.0       0.0       0.0       0.0
  360   375   0  DUMMY                            C                0.0        0.0    15.0    15.0     67.0    67.0      52.0      52.0       0.0
  360   420   0  DUMMY                            C                0.0        0.0    15.0    15.0    130.0   130.0     115.0      13.0       0.0
  360   430   0  DUMMY                            C                0.0        0.0    15.0    15.0     71.0    71.0      56.0      18.0       0.0
  360   450   0  DUMMY                            C                0.0        0.0    15.0    15.0    107.0   107.0      92.0      12.0       0.0
  365   455  32  SUG ALT MEDIA FOR PROGRAM                        10.0        0.0    57.0    67.0     73.0    83.0      16.0       0.0       0.0
  370    38   9  RECEIVE TENTATIVE REPORTS        C                5.0        0.0    42.0    47.0     62.0    67.0      20.0       0.0       0.0
  375   385   0  DUMMY                                             0.0        0.0    67.0    67.0     67.0    67.0       0.0       0.0       0.0
  375   440   7  EXMN EFFECTS OF CONSTRAINTS      C                8.0        0.0    67.0    75.0     67.0    75.0       0.0       0.0       0.0
  380   385   0  DUMMY                                             0.0        0.0    47.0    47.0     67.0    67.0      20.0      20.0       0.0
  380   518  63  QUANTV R MONRY ANALYZ OF RP      I               15.0        0.0    47.0    62.0     89.0   104.0      42.0       0.0       0.0
  380   519   9  REWRITE RES/BENEFIT STUD                         23.0        0.0    47.0    70.0     89.0   112.0      42.0       0.0       0.0
  385   460   9  COSTING OF RESEARCH PLANS        I                5.0        0.0    67.0    72.0     67.0    72.0       0.0       0.0       0.0
  385   461  63  DRAFT INTERMEDIATE CST REPT      C                5.0        0.0    67.0    72.0     67.0    72.0       0.0       0.0       0.0
  415   517   0  DUMMY                            C                0.0        0.0     7.0     7.0     96.0    96.0      89.0      10.0       0.0
  416   517   0  DUMMY                                             0.0        0.0    17.0    17.0     96.0    96.0      79.0       0.0       0.0
  417   450   0  DUMMY                                             0.0        0.0    23.0    23.0    107.0   107.0      84.0       4.0       0.0
  418   420   0  DUMMY                            C                0.0        0.0    15.0    15.0    130.0   130.0     115.0      13.0       0.0
  420   525   7  COST MANAGEMENT                  I                5.0        0.0    28.0    33.0    130.0   135.0     102.0       0.0       0.0
  430   440   7  INCPRT ASSMT INFO NT EL RPT      C                4.0        0.0    33.0    37.0     71.0    75.0      38.0      38.0       0.0
  430   514   0  DUMMY                                             0.0        0.0    33.0    33.0    104.0   104.0      71.0      29.0       0.0
  435   540  25  COST INSERVICE                   I                3.0        0.0    23.0    26.0     97.0   100.0      74.0      74.0       0.0
  435   550   7  DTRN BENEFITS OF INSERVICE       C                4.0        0.0    23.0    27.0    108.0   112.0      85.0      43.0       0.0
  440   465   7  PREPR SEMIFINAL ELMNT RPT        C                8.0        0.0    75.0    83.0     75.0    83.0       0.0       0.0       0.0
  450   485  29  COST PERT SYSTEM                 I                5.0        0.0    27.0    32.0    107.0   112.0      80.0       0.0       0.0
  455   465   0  DUMMY                                             0.0        0.0    67.0    67.0     83.0    83.0      16.0      16.0       0.0
  460   461   0  DUMMY                                             0.0        0.0    72.0    72.0     72.0    72.0       0.0       0.0       0.0
  461   475   7  REVIEW DRAFT                     C                5.0        0.0    72.0    77.0     72.0    77.0       0.0       0.0       0.0
  465   516   7  ADDNL REVSN OF ELEMNT REPT       C                5.0        0.0    83.0    88.0     83.0    88.0       0.0       0.0       0.0
  475   480   7  TYPE                             C                6.0        0.0    77.0    83.0     77.0    83.0       0.0       0.0       0.0
  480   515   7  DISSEMINATE                      C                5.0        0.0    83.0    88.0     83.0    88.0       0.0       0.0       0.0
  485   617  29  PLAN PERT REPORT                 C                3.0        0.0    32.0    35.0    112.0   115.0      80.0       0.0       0.0
  490   530   9  PRPR FINL RPT N FUTRC CNTR       I                5.0        0.0    10.0    15.0    133.0   138.0     123.0       0.0       0.0
  515   516   0  DUMMY                                             0.0        0.0    88.0    88.0     88.0    88.0       0.0       0.0       0.0
  516   520   7  RFRMT/FAC APPRVL OF EL REPT      C                5.0        0.0    88.0    93.0     88.0    93.0       0.0       0.0       0.0
  517   540  65  EXAM OVERALL CAPITAL COSTS       C                4.0        0.0    17.0    21.0     96.0   100.0      79.0      79.0       0.0
  518   550  63  APPLCN OF BNFT STUDS TO EL                        8.0        0.0    62.0    70.0    104.0   112.0      42.0       0.0       0.0
  519   612   9  PLAN ORG OF BENEFIT/RES                           3.0        0.0    70.0    73.0    112.0   115.0      42.0       0.0       0.0
  520   535   7  PREPARE FINAL REPORTS            C                2.0        0.0    93.0    95.0     93.0    95.0       0.0       0.0       0.0
  525   545   7  PLAN MANAGEMENT REPORT           I                3.0        0.0    33.0    36.0    135.0   138.0     102.0       0.0       0.0
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                                              A C T I V I T Y   L I S T                                               PAGE    3

PREC. SUCC. RES                              C  DATE                 DIRECT   EARLIEST          LATEST                      FLOAT
EVENT EVENT CDE  DESCRIPTION                 S  COMP      DURATION   COST   START - FINISH  START - FINISH  TOTAL   FREE     INDEP.

 530   545  0  DUMMY                         C              0.0      0.0    15.0    15.0   138.0   138.0   123.0    21.0     0.0
 530   555  7  TYPE FINAL REPORT                            3.0      0.0    15.0    18.0   152.0   155.0   137.0     0.0     0.0
 535   54  65  SYNTZ EL RD/FINLZ OPTG CST    I              5.0      0.0    95.0   100.0    95.0   100.0     0.0     0.0     0.0
 535   56   7  TYPE FINAL COPY                              2.0      0.0    95.0    97.0   139.0   141.0    44.0     0.0     0.0
 540   541  9  DESCRIBE RECEIVING SCH        I              3.0      0.0   100.0   103.0   110.0   113.0    10.0     0.0     0.0
 540   565 65  PLAN ORGNZATN OF COST REPRT   C              5.0      0.0   100.0   105.0   110.0   115.0    10.0     0.0     0.0
 540   57  63  ANALYSIS OF COSTS/BENEFITS    I             15.0      0.0   100.0   115.0   100.0   115.0     0.0     0.0     0.0
 541   542 65  PLAN COST FOR RCVG SCH        I              4.0      0.0   103.0   107.0   113.0   117.0    10.0     0.0     0.0
 542   715 65  DRAFT COST REPORT             S              8.0      0.0   107.0   115.0   117.0   125.0    10.0     0.0     0.0
 545   62   7  DRAFT MANAGEMENT REPORT       I             10.0      0.0    36.0    46.0   138.0   148.0   102.0     0.0     0.0
 550   57   0  DUMMY                                        0.0      0.0    70.0    70.0   115.0   115.0    45.0    45.0     3.0
 550   575  9  PLA ORGANZATN OF BENEFT REP   I              3.0      0.0    70.0    73.0   112.0   115.0    42.0     0.0     0.0
 555   90   0  DUMMY                                        0.0      0.0    18.0    18.0   155.0   155.0   137.0   137.0     0.0
 560   615  7  ARRANGMENT FR FNL REPT PREP                  3.0      0.0    97.0   100.0   141.0   144.0    44.0     0.0     0.0
 565   715 65  DRFT CST REPT-PRSNT TO COMM                 10.0      0.0   105.0   115.0   115.0   125.0    10.0     0.0     0.0
 570   61  63  PLAN ORGNZATN OF C/B SECTN    I              3.0      0.0   115.0   118.0   115.0   118.0     0.0     0.0     0.0
 575   715  9  DRFT BNFT REPT-PRSNT TO COM                 10.0      0.0    73.0    83.0   115.0   125.0    42.0     0.0     0.0
 612   613  9  DRAFT RES/BENEFIT REPORT                    10.0      0.0    73.0    83.0   115.0   125.0    42.0     0.0     0.0
 613   614  9  REVIEW DRAFT                                 4.0      0.0    83.0    87.0   125.0   129.0    42.0     0.0     0.0
 614   75   9  REWRITING                                    8.0      0.0    87.0    95.0   129.0   137.0    42.0    42.0     0.0
 615   815  0  DUMMY                                        0.0      0.0   100.0   100.0   144.0   144.0    44.0    44.0     0.0
 617   716 29  DRFT PERT REPT-PRSNT TO COM                 10.0      0.0    35.0    45.0   115.0   125.0    80.0     0.0     0.0
 618   73  63  DRAFTING                                    10.0      0.0   118.0   128.0   118.0   128.0     0.0     0.0     0.0
 620   717  7  APPROVE MANAGEMENT REPORT                    3.0      0.0    46.0    49.0   148.0   151.0   102.0     0.0     0.0
 715   72  65  REVIEW DRAFT                                 4.0      0.0   115.0   119.0   125.0   129.0    10.0     0.0     0.0
 716   725  7  REVIEW DRAFT                                 4.0      0.0    45.0    49.0   125.0   129.0    80.0     0.0     0.0
 717   745  7  TYPE MANAGEMENT REPORT                       4.0      0.0    49.0    53.0   151.0   155.0   102.0     0.0     0.0
 718   735 63  REVIEW DRAFTS                                4.0      0.0    83.0    87.0   125.0   129.0    42.0     0.0     0.0
 720   75  65  REWRITING                                    8.0      0.0   119.0   127.0   129.0   137.0    10.0    10.0     0.0
 725   75  29  REWRITING                                    8.0      0.0    49.0    57.0   129.0   137.0    80.0    80.0     0.0
 730   74   7  REVIEW DRAFT                                 4.0      0.0   128.0   132.0   128.0   132.0     0.0     0.0     0.0
 735   75  63  REWRITING                                    8.0      0.0    87.0    95.0   129.0   137.0    42.0    42.0     0.0
 740   75  63  REWRITING                                    5.0      0.0   132.0   137.0   132.0   137.0     0.0     0.0     0.0
 745   90   0  DUMMY                                        0.0      0.0    53.0    53.0   155.0   155.0   102.0   102.0     0.0
 750   815  7  FINAL REPT APPROVD BY COMMIT                 7.0      0.0   137.0   144.0   137.0   144.0     0.0     0.0     0.0
 815   85   7  FINAL EDITING                                7.0      0.0   144.0   151.0   144.0   151.0     0.0     0.0     0.0
 850   90   7  TYPE/PROOF                                   4.0      0.0   151.0   155.0   151.0   155.0     0.0     0.0     0.0
 900   95   7  DUPLICATE/BIND                              15.0      0.0   155.0   170.0   155.0   170.0     0.0     0.0     0.0
 950   1001 7  DISSEMINATE                                  1.0      0.0   170.0   171.0   170.0   171.0     0.0     0.0     0.0
```

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Event List

The list of events provides an indicative of the specific event, description of that event and the earliest and latest occurrence of that event. These values are used in the computation of information in the Activity List and may also be useful for signaling milestones, or events of major importance. A sample page of this part of the report is included.

```
                                        E V E N T   L I S T                                  PAGE    4
DISTRICT - RETEP PROJECT                                  NOV 1, 1969
PROJECT TITLE - PERT ANALYSIS OF RETEP  -  PHASE II

TIME UNIT - DAYS
COST UNIT -  NADA                                                          SCHEDULE           0
                                                                           DIRECT COST      0.0
ACTIVITY COUNT -   134                                                     DURATION       171.0
EVENT COUNT -       95



EVENT                       DESCRIPTION                        EARLIEST       LATEST
                                                               OCCURRENCE     OCCURRENCE

  115
  116                                                                 0.0          0.0
  117                                                                10.0         30.0
  118                                                                12.0         32.0
  119                                                                 3.0         14.0
  125                                                                 3.0         83.0
  135                                                                 6.0         17.0
  145                                                                31.0         42.0
  215                                                                31.0         42.0
  216                                                                10.0         10.0
  217                                                                 2.0         81.0
  218                                                                17.0         97.0
  225                                                                27.0         51.0
  235                                                                15.0         15.0
  245                                                                 4.0        102.0
  255                                                                22.0        102.0
  265                                                                27.0         47.0
  275                                                                27.0         52.0
  280                                                                32.0         52.0
  285                                                                22.0         22.0
  290                                                                13.0        115.0
  295                                                                18.0         56.0
  315                                                                13.0         87.0
  316                                                                 9.0         57.0
  317                                                                22.0        102.0
  320                                                                46.0         57.0
  325                                                                32.0         42.0
  330                                                                42.0         42.0
  335                                                                 8.0        108.0
  350                                                                42.0         62.0
  355                                                                27.0         62.0
  360                                                                57.0         57.0
  365                                                                15.0         67.0
  370                                                                57.0         73.0
  375                                                                42.0         62.0
  380                                                                67.0         67.0
  385                                                                47.0         67.0
  415                                                                67.0         67.0
  416                                                                 7.0         96.0
  417                                                                17.0         96.0
  418                                                                23.0        107.0
                                                                     19.0        130.0
```

Critical Activities

The list of critical activities consists of each activity having zero Total Float. These are the activities which if delayed at all will cause a delay in the project. They are identified by preceding and succeeding event numbers, Description, Duration, Early Start and Late Finish. The entire list of Phase II critical activities is included in the following sample.

```
                                  C R I T I C A L   A C T I V I T I E S                                     PAGE    7
DISTRICT - WETEP PROJECT                                  NOV 1, 1969
PROJECT TITLE - PERT ANALYSIS OF WETEP  -  PHASE II

TIME UNIT - DAYS
COST UNIT -  NADA                                                                     SCHEDULE              0
                                                                                      DIRECT COST         0.0
ACTIVITY COUNT -    134                                                               DURATION          171.0
EVENT COUNT -        96



                                                                                    EARL. START   LAT. FINISH
PREC. SUCC. RES                                     C   DATE                DIRECT   TIME FOR      TIME FOR
EVENT EVENT CDE  DESCRIPTION                        S   COMP     DURATION    COST    ACTIVITY      ACTIVITY

 115   215   7  DEV SAMP ELE (SCI) FORMAT           C                10.0     0.0        0.0          10.0
 215   225   7  MODIFY INSTRUMENT                   C                 5.0     0.0       10.0          15.0
 225   280   7  WORKSHOP ELEMENT SPECIFICAN         C                 7.0     0.0       15.0          22.0
 280   325   7  COMPLETION OF ALL ELEMENTS          C                20.0     0.0       22.0          42.0
 325   355   7  SYNTHESIZE ELEMENT REPORTS          C                15.0     0.0       42.0          57.0
 355   375   7  TENTATIVE CSTG OF PROGRAM           C                10.0     0.0       57.0          67.0
 375   385   0  DUMMY                                                 0.0     0.0       67.0          67.0
 375   440   7  EXMN EFFECTS OF CONSTRAINTS         C                 8.0     0.0       67.0          75.0
 385   460   9  COSTING OF RESEARCH PLANS           I                 5.0     0.0       67.0          72.0
 385   461  63  DRAFT INTERMEDIATE CST REPT         C                 5.0     0.0       67.0          72.0
 440   465   7  PREPR SEMIFINAL ELMNT RPT           C                 8.0     0.0       75.0          83.0
 460   461   0  DUMMY                                                 0.0     0.0       72.0          72.0
 461   475   7  REVIEW DRAFT                        C                 5.0     0.0       72.0          77.0
 465   516   7  ADDNL REVS. OF ELEMNT REPT          C                 5.0     0.0       83.0          88.0
 475   480   7  TYPE                                C                 6.0     0.0       77.0          83.0
 480   515   7  DISSEMINATE                         C                 5.0     0.0       83.0          88.0
 515   516   0  DUMMY                                                 0.0     0.0       88.0          88.0
 516   520   7  REAMT/FAC APPRVL OF EL REPT         C                 5.0     0.0       88.0          93.0
 520   535   7  PREPARE FINAL REPORTS               C                 2.0     0.0       93.0          95.0
 535   540  65  SYNTZ EL RD/FINLZ OPTG CST          I                 5.0     0.0       95.0         100.0
 540   570  63  ANALYSIS OF COSTS/BENEFITS          I                15.0     0.0      100.0         115.0
 570   618  63  PLAN ORGNZATN OF C/B SECTN          I                 3.0     0.0      115.0         118.0
 618   730  63  DRAFTING                                             10.0     0.0      118.0         128.0
 730   740   7  REVIEW DRAFT                                          4.0     0.0      128.0         132.0
 740   750  63  REWRITING                                             5.0     0.0      132.0         137.0
 750   815   7  FINL REPT APPROVD BY COMMIT                           7.0     0.0      137.0         144.0
 815   850   7  FINAL EDITING                                         7.0     0.0      144.0         151.0
 850   900   7  TYPE/PROOF                                            4.0     0.0      151.0         155.0
 900   950   7  DUPLICATE/BIND                                       15.0     0.0      155.0         170.0
 950  1001   7  DISSEMINATE                                           1.0     0.0      170.0         171.0
```

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Activity List by Responsibility

This output is essentially the same information as provided by the Activity List. Two differences are evident. First, the activities are sorted according to responsibility. Second, each schedule day is converted to a calendar date for the convenience of user. In addition, the activities are identified as to status code so that all activities of common status are published in one block.

A user of this system would review his specific Activity List and make appropriate adjustments in the Status Code. Any alterations in the estimated duration may also be noted. This document serves as the communication device for the various responsible members of the WETEP team illustrating the progress of the project, and to indicate their own progress through a regularly scheduled update. All notations made upon this document become a part of the regular update procedure if authorized by the appropriate signature at the bottom of the page.

Separate listing will be produced for each unique responsibility code. A sample of one listing for co-director, John M. Kean, is included on the following page.

5

```
                                         A C T V I T Y   L I S T
                                                   B Y
                                         R E S P O N S I B I L I T Y

DISTRICT - WETEP PROJECT                        10/31/69                                                    PAGE   7
    PROJECT  - PERT ANALYSIS OF WETEP  -  PHASE II                                      DATE OF DATA - NOV 1, 1969

 THIS LIST CONTAINS ALL THE ACTIVITIES FOR WHICH YOU ARE RESPONSIBLE.  REVIEW THIS INFORMATION AND PRINT EACH CORRECTION IN THE
 SPACE DIRECTLY UNDER THE ITEM. CORRECT ONLY ELEMENTS WHICH REQUIRE CHANGE. STATUS CODE C = COMPLETE I = IN PROGRESS S = SCHEDULED

PREC. SUCC. RES                              C   DATE              DIRECT      EARLIEST           LATEST         TOTAL   FREE   INDEP.
EVENT EVENT CDE   DESCRIPTION                S   COMP DURATION      COST     START - FINISH   START - FINISH     FLOAT   FLOAT   FLOAT


                                                        SCHEDULED ACTIVITIES

 380   519  9  REWRITE RES/BENEFIT STUD      S             23.0        0.0  7/ 9/69  8/11/69  9/ 8/69 10/ 9/69    42.0     0.0     0.0
 519   612  9  PLAN ORG OF BENEFIT/RES       S              3.0        0.0  8/11/69  8/14/69 10/ 9/69 10/14/69    42.0     0.0     0.0
 614   75   9  REWRITING                     S              8.0        0.0  9/ 4/69  9/16/69 11/ 3/69 11/13/69    42.0    42.0     0.0
 575   716  9  DRFT BNFT REPT-PRSNT TO COM   S             10.0        0.0  8/14/69  8/28/69 10/14/69 10/28/69    42.0     0.0     0.0
 612   613  9  DRAFT RES/BENEFIT REPORT      S             10.0        0.0  8/14/69  8/28/69 10/14/69 10/28/69    42.0     0.0     0.0
 613   614  9  REVIEW DRAFT                  S              4.0        0.0  8/28/69  9/ 4/69 10/28/69 11/ 3/69    42.0     0.0     0.0
                                                        COMPLETED ACTIVITIES
 115   116  9  IDENTN OF RESOURCE STUDIES    C             10.0        0.0  5/ 1/69  5/15/69  5/29/69  6/13/69    20.0     0.0     0.0
 117   255  9  REVIEW TEACHER EFFECTIVENES   C             15.0        0.0  5/19/69  6/10/69  6/17/69  7/ 9/69    20.0     0.0     0.0
 370   38   9  RECEIVE TENTATIVE REPORTS     C              5.0        0.0  7/ 1/69  7/ 9/69  7/30/69  8/ 6/69    20.0     0.0     0.0
 117   335  9  ANALYZE LEARNING PRINCIPLES   C             30.0        0.0  5/19/69  7/ 1/69  6/17/69  7/30/69    20.0     0.0     0.0
 255   37   9  PLN RES ON TCHR CHARACTERCS   C             15.0        0.0  6/10/69  7/ 1/69  7/ 9/69  7/30/69    20.0     0.0     0.0
 218   370  9  ANALYZE BACKGROUND DATA       C             11.0        0.0  6/10/69  6/25/69  7/15/69  7/30/69    24.0     4.0     0.0
 118   33   9  SPEC TSKS/PROCDR F FUTRC CT   C              5.0        0.0  5/ 6/69  5/13/69  9/26/69 10/ 3/69   100.0     0.0     0.0
 117   218  9  PLAN BCKGRND RES ON TCHR ED   C             15.0        0.0  5/19/69  6/10/69  6/23/69  7/15/69    24.0     0.0     0.0
 116   117  9  ASSIGNMT OF RESPONSIBILITS    C              2.0        0.0  5/15/69  5/19/69  6/13/69  6/17/69    20.0     0.0     0.0
                                                        ACTIVITIES IN PROGRESS
 385   46   9  COSTING OF RESEARCH PLANS     I              5.0        0.0  8/ 6/69  8/13/69  8/ 6/69  8/13/69     0.0     0.0     0.0
 330   49   9  COST FUTURISTIC CENTER        I              2.0        0.0  5/13/69  5/15/69 11/ 5/69 11/ 7/69   123.0     0.0     0.0
 330   55   9  DTRN BENFT OF FTRISTC CNTR    I              4.0        0.0  5/13/69  5/19/69 10/ 3/69 10/ 9/69   100.0    58.0     0.0
 490   53   9  PREP FINL RPT N FUTRC CNTR    I              5.0        0.0  5/15/69  5/22/69 11/ 7/69 11/14/69   123.0     0.0     0.0
 540   541  9  DESCRIBE RECEIVING SCH        I              3.0        0.0  9/23/69  9/26/69 10/ 7/69 10/10/69    10.0     0.0     0.0

                                                                  SIGNATURE -
```

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Activity List by Total Float

This report is used by management to assess the overall progress of the project. The information provided is essentially the same as that in the initial report, but is sorted according to each activity's earliest start. Therefore, this document provides an overall view of the program in its development and will highlight those activities which are causing significant delay.

A sample page of this activity list in the PERT/CPM report follows.

```
                                              A C T V I T Y   L I S T
                                                        B Y
                                               T O T A L   F L O A T

DISTRICT - WETEP PROJECT                          10/31/69                                           PAGE   1
    PROJECT  - PERT ANALYSIS OF WETEP  -  PHASE II                             DATE OF DATA - NOV 1, 1969

PREC. SUCC. RES                              C   DATE           DIRECT      EARLIEST           LATEST         TOTAL   FREE   INDEP.
EVENT EVENT CDE   DESCRIPTION                S   COMP DURATION   COST     START - FINISH   START - FINISH    FLOAT   FLOAT   FLOAT


 115   215   7  DEV SAMP ELE (SCI) FORMAT   C          10.0       0.0   5/ 1/69  5/15/69  5/ 1/69  5/15/69    0.0     0.0     0.0

 115   116   7  SPECIFY SUPPORT SYSTEMS     C           3.0       0.0   5/ 1/69  5/ 6/69  5/16/69  5/21/69   11.0     0.0     0.0

 115   225   7  PREPARE FOR WORKSHOP        C           0.0       0.0   5/ 1/69  5/ 1/69  5/22/69  5/22/69   15.0    15.0    15.0

 115   114   9  IDENTN OF RESOURCE STUDIES  C          10.0       0.0   5/ 1/69  5/15/69  5/29/69  6/13/69   20.0     0.0     0.0

 115   315   7  IDENT CRITERIA F BDGT CONST C           5.0       0.0   5/ 1/69  5/ 8/69  7/16/69  7/23/69   52.0     0.0     0.0

 115   214   7  ASSIGN RESPONSIBILITIES     C           2.0       0.0   5/ 1/69  5/ 5/69  8/22/69  8/26/69   79.0     0.0     0.0

 216   414  63  OB CPTL CST/OP CST O CUR PP C          15.0       0.0   5/ 5/69  5/26/69  8/26/69  9/17/69   79.0     0.0     0.0

 216   415  65  OB CAPTL CST F WETEP/ED BLD C           5.0       0.0   5/ 5/69  5/12/69  9/10/69  9/17/69   89.0     0.0     0.0

 118   125   7  RCA/RADIO/TV RELNSHP ESTAB  C           3.0       0.0   5/ 6/69  5/ 9/69  5/21/69  5/26/69   11.0     0.0     0.0

 118   29   14  ASSESSMNT PROCUR IDENT      C          15.0       0.0   5/ 6/69  5/27/69  6/30/69  7/22/69   38.0     0.0     0.0

 118   295  25  SPEC INSERVICE ACTIVITIES   C          10.0       0.0   5/ 6/69  5/20/69  8/20/69  9/ 4/69   74.0     0.0     0.0

 116   119   0  DUMMY                       C           0.0       0.0   5/ 6/69  5/ 6/69  8/28/69  8/28/69   80.0     0.0     0.0

 119   217  29  REFINE MASTER NETWORK       C          14.0       0.0   5/ 6/69  5/26/69  8/28/69  9/18/69   80.0     0.0     0.0

 119   314  29  IDENTIFY 14 SUBNETWORKS     C           5.0       0.0   5/ 6/69  5/13/69  9/18/69  9/25/69   94.0    14.0     0.0

 119   235  29  DETMN SCIENCE PERT NETWORK  C           1.0       0.0   5/ 6/69  5/ 7/69  9/24/69  9/25/69   98.0     0.0     0.0

 118   33    9  SPEC TSKS/PROCDR F FUTRC CN C           5.0       0.0   5/ 6/69  5/13/69  9/26/69 10/ 3/69  100.0     0.0     0.0

 118   285   7  IDENT INSTEL STSTEM MANAGMT C          10.0       0.0   5/ 6/69  5/20/69  9/30/69 10/14/69  102.0     0.0     0.0

 235   316   0  DUMMY                       C           0.0       0.0   5/ 7/69  5/ 7/69  9/25/69  9/25/69   98.0    18.0     0.0

 315   361   7  IMPZ CONSTANT SELCTVL ON EL C          10.0       0.0   5/ 8/69  5/22/69  7/23/69  8/ 6/69   52.0     0.0     0.0

 125   135  32  TELECOMMUNICATN SPECIFICATN I          25.0       0.0   5/ 9/69  6/16/69  5/26/69  7/ 1/69   11.0     0.0     0.0

 125   145  32  IDENTIFY POTENTIAL MEDIA    C          15.0       0.0   5/ 9/69  6/ 2/69  6/10/69  7/ 1/69   21.0    10.0     0.0

 415   517   0  DUMMY                       C           0.0       0.0   5/12/69  5/12/69  9/17/69  9/17/69   89.0    10.0     0.0

 330   551   9  DTMN BENFT OF FTRISTC CNTR  I           4.0       0.0   5/13/69  5/19/69 10/ 3/69 10/ 9/69  100.0    58.0     0.0

 330   491   9  COST FUTURISTIC CENTER      I           2.0       0.0   5/13/69  5/15/69 11/ 5/69 11/ 7/69  123.0     0.0     0.0
```

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Benefits of PERT/CPM for WETEP

The overall complexity of planning and implementing the WETEP project creates a challenge for organization and management reporting. The multitude of responsibilities and tasks are evident elsewhere in this report. PERT/CPM methodology was adopted as a mechanism for monitoring the interfacing of the various program dimensions. The procedures outlined in this report are an attempt to specify a unique information system. It is a dynamic system containing procedures for updating according to actual progress. It is a planning tool in that it provides a graphic display of component interdependence. It is a management device providing information on a regular, periodic basis.

The output of such a system of reporting is expected to yield a variety of benefits. Both project management and staff are expected to glean valuable information throughout the progress of this project.

Benefits to Project Management

Rarely have educational enterprises undertaken projects of such broad scope for the education of teachers. The PERT/CPM techniques will provide a structure for planning. The procedure demands clear specifications of elements and modules. These will be placed in a logical sequence clearly indicating the relationship of one project element to another. Estimated durations provide a tentative schedule of occurrences signaling the critical bench-marks of progress. At any point in time, project management can identify the progress which has been made. Reports isolate those situations which require increased support. The analytical properties of PERT/CPM offer a most promising planning opportunity. As the system modifies itself through the periodic review procedure, potential future delays and schedule conflicts will be revealed.

Benefits to WETEP Faculty

Participation in the WETEP PERT/CPM procedure will provide current information with respect to program development. Specific modules will be dependent upon a variety of support staff for the development of materials and procedures. The application of these planning techniques will insure the availability of these materials when they are required. The initial time estimates and subsequent reports will provide a basis for faculty planning. Each module faculty member will be in a position to clearly see the implications of his own contribution to the timing of the entire project.

Benefits to WETEP Support Staff

One of the most complex dimensions of WETEP involves the coordination of support activities with module development. Clearly there will be points in time at which demand on media, assessment, and computer staff will be high. Additional personnel will be required to satisfy these periods of high demand. The information available through the WETEP PERT/CPM will provide lead time for planning. It will be possible for the support groups to assess the manpower required to cover the necessary demands. The support groups will thus be able to coordinate their efforts with the overall demands of the program.

Each of the support groups will be required to establish its own procedures and management. For example, the media staff may be required to set up a studio for the production of video tape. This time investment must be coordinated with specific demands of WETEP elements. The activities associated with the housekeeping details can be best coordinated with the broader objectives of WETEP through the application of PERT/CPM technology.

Benefits to Other Campuses

WETEP is designed for partial or complete implementation on other campuses. The networks and reports developed by this project will provide useful information regarding expected durations and possible problem areas for future applications. The series of reports will represent a source of historical documentation.

THE WETEP ASSESSMENT PROGRAM

T. Anne Cleary
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Introduction

"The central purpose of testing in WETEP is effective and continuous, diagnostic and prescriptive feedback for each student; therefore, it is necessary to radically depart from current methods of test construction and administration."[1] Current educational testing generally occurs at fixed times and is not usually designed to provide meaningful feedback for the student. In order for testing to serve the needs of WETEP, new procedures will have to be designed. This paper describes the WETEP Assessment Program, the program that will be charged with the development and implementation of the innovative assessment procedures.

Three characteristics of WETEP make necessary the development of innovative assessment procedures: 1) individualized instruction, 2) the variety of modes of instruction that will be used, and 3) the fact that students will have a major responsibility for curriculum choices.

If instruction is individualized, standard administrations of paper-pencil tests to large groups of students will no longer be desirable or feasible, for assessment, evaluation, and feedback will be required at different times for each student. Clearly, the flexible instructional programming would be vitiated by inflexible assessment.

Because a wide variety of instructional modes will be used, it will be possible to obtain many types of information that currently are not available. For example, videotaping of a student involved in microteaching is potentially an extremely relevant source of information about the student's teaching performance. It would be wasteful indeed not to take advantage of this information, but methods of assessment will need to be developed that are both appropriate and compatible with the corresponding modes of instruction.

The third characteristic of WETEP that requires a change in thinking about assessment is the increased responsibility for curriculum choices that is given to the student. The student who is faced with choices regarding learning goals, learning resource modes, and learning rate[2] needs information about his previous and expected future performance. Within WETEP, a student must be able to request assessment: he may wish information from the pre-assessment for a number of modules before he decides which he wishes to enter; he may believe that he is qualified to bypass a module or an element and, therefore, request the post-assessment for this unit; or he may have more general questions regarding, for example, his standing in achievement relative to master teachers or specialists in a particular area.

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[1] T. Anne Cleary, Robert L. Linn, and Donald A. Rock, "Assessment Procedures for WETEP," WETEP, Vol. I: Position Papers, School of Education, University of Wisconsin, Madison, Wisconsin, 1969.

[2] M. Vere DeVault, et. al., "The WETEP Instructional Program," WETEP Feasibility Study, Vol. V: Program and Support Systems.

But WETEP will not only require innovative assessment, it will also facilitate its development and implementation. At the same time that the emphasis on individualized instruction makes flexible assessment necessary, it also makes it possible. The same computer facilities that are used for computer-assisted instruction can be used for computer-assisted testing; the management system required by the flexible instruction makes it possible to monitor the assessment.

The WETEP assessment program, a central organization responsible for the development of appropriate assessment procedures and the coordination of research on assessment, assures the development of educationally relevant assessment procedures. In the past, the majority of research and development activities in the area of assessment have been supported by industry, government, and commercial test publishers. Although it is probable that educational institutions have administered more tests than has any other type of organization, they have not assumed responsibility for their research and development. In fact, as sophistication in testing has increased and development costs have mounted, educational institutions have almost withdrawn from systematic research and development in testing.

WETEP will reverse this trend. Recognizing the importance of educational assessment, WETEP will provide the facilities and the staff to develop assessment procedures that meet the educational requirements of the faculty.

Organization of the WETEP Assessment Program

The activities of the WETEP Assessment Program can be divided into three major categories:

1. Test Development: development, implementation, and analysis of assessment procedures for the instructional units of WETEP.

2. Research: development of a coordinated program of research on assessment procedures.

3. Training: development of an instructional program to provide in-service training for faculty and practical experience for students interested in measurement.[3]

The distinctions among these three categories of activities are necessarily somewhat artificial: test development is in a real sense a research activity, and the training will involve both test development and research. Nevertheless, the categories can define the major foci of personnel within the WETEP Assessment Program.

Test Development. The personnel working in Test Development will be responsible for the assessment procedures for the instructional units of WETEP. As the instructional units are developed, professional measurement personnel will work with the faculty to provide the necessary assessment. The faculty will identify the objectives of the instruction, and the assessment personnel will assume responsibility for appropriately assessing the students' attainment of these objectives.

For some elements, especially, the process of test development will be difficult; it will require an intricate working relationship between faculty and assessment personnel. For example, for certain tasks, or in some areas of a highly specialized nature, only the faculty will have sufficient understanding of the material to develop an adequate instrument. In such cases, however, the assessment personnel will be able to offer suggestions and guidelines for test development and assistance in statistical analysis of the developed instrument.

After the initial development of the assessment procedures, the Test Development personnel will be responsible for maintaining and updating the assessment procedures. By constantly monitoring the assessment procedures, the Test Development personnel will be able to alert the faculty to any changes in the student populations entering or leaving the instructional units. Any such changes, of course, have important implications for instruction as well as for assessment.

In addition, the Test Development personnel will be responsible for implementing new assessment procedures being developed in the research program. As a result of their close association with the faculty and their awareness of the assessment needs of the instructional units, the Test Development personnel will also be able to define for the research program some of the more pressing requirements for new assessment procedures.

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[3] Theoretical training in measurement is provided by the measurement and evaluation modules of the Educational Psychology Element.

Research. The research carried out within WETEP will fall into two categories: Program Research, designed to answer immediate questions directly related to the needs of Test Development; and Basic Research, contributing to the theoretical knowledge in assessment and evaluation.

The research in both of these two categories will be conducted largely by the faculty. While the WETEP Assessment Program will have a minimal research staff to coordinate research activities, grants will be made to faculty who are interested in carrying out relevant research.

It is expected that a major portion of research activities will be conducted by the faculty of the University of Wisconsin at Madison. However, there is no reason not to make grants to faculty of other campuses of the University of Wisconsin or to faculty of other universities if research proposals from these institutions appear to be strong.

Program Research. Program research will concentrate on obtaining answers to a number of immediate questions. One area of primary interest will be computer assisted testing. The research needs in this area have been described by Cleary, Linn, and Rock.[4] In addition, there is a need for research and development activities with regard to both computer hardware and software. The computers can be used to generate tests from item files, provide reports giving meaningful feedback to the students, and monitor student progress.

A second problem immediately facing Program Research is the development of behavioral rating schedules (BRS). Since performance plays an important role in the teacher-training program, there are numerous aspects of the program which cannot be adequately evaluated without an assessment of performance. Clinical and laboratory experiences (e.g., lab school observations, student teaching and internship, microteaching) are designed to provide an opportunity for students to demonstrate complex skills and capabilities which are not easily measured.

In the past, visits by local and university-affiliated supervisors have served as the primary means of assessing such pre-service performance. However, no comprehensive or standardized rating has yet been developed which adequately measures all relevant teacher variables. It is important to know whether the prospective teacher can motivate students, adjust his teaching style to changing circumstances, establish effective relationships among parent, pupil, and teacher, and assess and evaluate pupil performance. The development of such a rating schedule for teacher behaviors will not be an easy task. Nevertheless, the difficulty of the task must be weighted against its importance.

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[4] Anne Cleary, Robert L. Linn, and Donald A. Rock, op. cit.

In its final form, the schedule might require video tape time-samples of the teacher and his pupils. The tape clips might then be scored on a number of relevant dimensions. Hopefully, the same schedule could be used to assess behavior in microteaching, practice teaching, and final professional teaching, although some of the dimensions might not be used at the lower levels. Additional research will be required to identify those behaviors which distinguish the effective teacher. Then some relatively uncomplicated technique for recording and scoring such behaviors will be devised.

Once the rating schedule has been developed, teaching assistants will be trained in the use of it, or at least in major portions of it, and thus assume responsibility for assessing many of the clinical and laboratory experiences. Furthermore, the teacher candidate will be familiarized with the rating scale and its use and thus know more precisely what is expected of him. He can evaluate his own performance and compare his evaluation with that of the assigned raters.

An additional advantage of such an assessment procedure is the case with which feedback could be given to the faculty member who teaches methods, for example, but is unable to observe the teacher candidate when he applies those methods in professional teaching. If the video tape rating schedule is used during practice teaching or in follow-up evaluation of the teacher, the professors responsible for methods could review those tape segments which relate to their field.

Similar scales and assessment procedures will be developed for measuring specific skills in such areas as art, music, physical education, and counseling. The development of such scales will increase assessment validity, assure students of well-defined criteria, and allow trained assistants to assess complex performance.

A third area of research results from the fact that WETEP provides regular personal contact between faculty and students. Students will meet with faculty individually in conference and in group seminars. An important part of the WETEP assessment, therefore, will result from the personal judgments of the faculty. Research is needed to find ways to maximize the value of these judgments. The WETEP assessment personnel will develop guidelines and suggestions for conducting conferences and seminars, evaluating individual and group responses, and recording behavior.

There are definite advantages to the development of instruments which can be used to assess the nonstructured educational process. Learning and assessment can be unobtrusively merged. It is also conceivable that non-structured assessment is relatively less costly, produces less anxiety, and is a more efficient indicator of educational effectiveness. In any event, the informal interactions among students, and between them and faculty, must be carefully and systematically assessed in order to establish the utility of such sessions.

Basic research will fall into two broad categories: assessment and evaluation. Within each of these categories, new analytic techniques, as well as new types of appropriate designs, will need to be developed. In order to solve the analytic problems, which will stem partly from the stochastic nature of the measurement and evaluation data that will be collected, researchers in applied statistics and measurement as well as in numerical analysis and computer science will need to be involved in the effort.

In order to develop appropriate new designs within which to collect the required measurement and evaluation information, a close liaison will need to be established between statisticians and measurement theorists, and those responsible for developing and implementing computer-assisted testing and instruction techniques, as well as those responsible for other new instruction and training methods. This close liaison will insure that the basic research carried out on the development of new designs will be applicable in the environment created by the use of computers in testing and instruction, as well as by the individualized nature of WETEP.

In-service Program.[5] The third major task of the assessment group will be development of a faculty in-service training program. An important role of the in-service program will be to provide faculty members with research information regarding the methods and uses of assessment. Provision will be made for acquainting professors with procedures for test development, item analysis, test administration, and interpretation of test data. In addition, the assessment group will act as research consultants for professors requesting advice on individual projects.

Benefits

The WETEP assessment program will benefit students, faculty, and administration. Among the more obvious advantages of the WETEP assessment program are the following:

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[5] Margaret Ammons and David C. Davis, "In-Service Education for the WETEP Faculty," WETEP Feasibility Study, Vol. V: Program and Support Systems.

(1) An Innovative Approach to Educational Assessment. By coordinating the assessment activities of the educational institution, WETEP will encourage an innovative approach to educational assessment. While the professionals in the program are charged with the implementation of the best of new procedures, interaction with the professors will enable them to develop and communicate ideas emerging from the teaching staff. Through basic and program research, WETEP will provide both the motivation and the resources which will surely lead to major contributions in the fields of measurement and testing.

(2) Reduction in the Amount of Time Required of Faculty and Students to Obtain a Given Amount of Information. The proposed procedures for test construction, test administration, scoring, recording, and feedback will all directly or indirectly economize time for the student and professor. For the same amount of time spent in assessment, more information will be obtained. The faculty will be relieved of much of the time consuming work required for developing measurements. The student will find himself taking shortened tests, tailored to his ability and achievement level. Most of the clerical work connected with scoring, recording, and providing feedback will be handled by assessment personnel rather than by the professor and his assistant.

(3) Increased Uses for Assessment. Rather than the conventional use of tests, whereby an institution or a professor passes judgment on a student's ability or achievement, the assessment procedures of WETEP will be used also in student decision making, research, and in programs evaluation.

(4) Greater Interest and Improved Attitudes Toward Testing on the Part of Students. Since a primary goal of assessment is to provide information which facilitates decision making, and since students will assume an increasing amount of responsibility for their program decisions, much of the assessment will be recognized as a personal rather than an institutional requirement. Recognition of assessment as a personal requirement will generate concern on the part of the student for the amount, type, and timing of the assessment.

(5) Facility in Obtaining and Using Individual and Group Profiles. The constant availability of assessment personnel for the clerical tasks of scoring, recording, and providing feedback will insure relatively prompt and accurate handling of data. Assorted information can be quickly obtained and disseminated.

(6) Assessment of Performance in Teaching. Laboratory and field experiences have taken many forms over the past years, (e.g., lab-

school observations, microteaching, student teaching, internship). However, little use has been made of the assessment possibilities in such experiences. With the development of a comprehensive behavioral rating scale (BRS), the assessment program of WETEP will provide a measure for assessing teacher behavior.

(7) Increased Instructional Value in Assessment Procedures. With the amount and type of optional assessment provided for the student, he may use a pre-test as an index to course work expectations. He may also request frequent interim tests as instructional guides which direct or redirect his activities. Furthermore, there will be no item or assessment task for which both the correct response and a thorough explanation are not available.

(8) Increased Specificity in Learning Goals. The assurance of appropriate instruments for the assessment of modules, subelements, and elements will give increased credibility to course work outlines. In addition, the short-term, highly concentrated module approach yields well defined test goals and helps minimize ambiguity.

(9) Flexibility in the Individual's Assessment Schedules. Since assessment procedures will not be dependent upon course work completion by a group, the individual's pace becomes the relevant factor in assessment timing. This holds true not only for the optional assessment but even for that which is required. The availability of parallel forms for all assessment measures will provide the test-security needed for such assessment flexibility.

(10) Reduction in the Amount of Irrelevant and Redundant Assessment. The use of branching techniques assures that the assessment of the individual is based on his ability and achievement level; content which is much too easy or much too difficult is avoided. Furthermore, because the reliability and validity of assessment measures will be insured, repetition of tasks measuring the same content or skill will be virtually unnecessary. Since students will be selecting much of the assessment, they will be controlling its amount and its nature on the basis of their self-perceived needs.

(11) Facilitation of Intra- and Interdependence of Elements. Because all assessment measures will be centrally located, filed, and cross-referenced, and since a retrieval system will provide for the assembling of specified items, measurement instruments designed to meet various specifications can be readily developed.

Thus, the relationship of one module to another within an element or between elements can be conveniently assessed. Likewise, any one task, e.g., clinical experience with pupils, may serve as a meaningful measure for the assessment of applied content over several modules. Emphasis on the relationships between various content areas enriches not only the instructional component of WETEP, but distinguishes its assessment procedures as means of evaluating practical and complex behaviors.

(12) Reduction in the Cost of Assessment Relative to Its Functions. The quantity, quality, and variety of assessment techniques provided by WETEP, and the multiple use of the data discussed above (see Benefit 4) make the cost of any one measure relatively low when compared to the estimated cost of a current, teachermade instrument.

(13) Model for Other Instructional Programs. In addition to using WETEP as a guide for revising assessment procedures, all institutions and instructional programs will be able to share in the results of the research and experimentation undertaken by the WETEP assessment program. The WETEP assessment program may provide limited service, advice, or supervision to an outside agency which requests such assistance.

(14) Faculty In-service Training. The interdependency of assessment personnel and faculty assumes a mutual interest in the other's activities. Faculty interest in assessment procedures will be responded to in a variety of ways. Besides offering assistance in test development and in the clerical duties related to test administration, the WETEP assessment program will provide the faculty with explanations of test characteristics, interpretation of test results, and the rationale underlying all on-going research projects. Faculty members will be acquainted with the step-wise procedure of test construction and the processes by which test characteristics (reliability and validity) are verified. They will also be adequately prepared to competently administer such instruments.

This is by no means an exhaustive list of the benefits which would result from the WETEP assessment program. On the other hand, it poses an argument for the development of the WETEP assessment program in which major experimentation can be implemented.

IN-SERVICE EDUCATION FOR THE WETEP FACULTY

Margaret Ammons
David C. Davis

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The WETEP design requires that a competent faculty perform highly sophisticated interpersonal roles. The critical nature of this requirement to the success of WETEP demands continuous in-service education for faculty and for new staff as they join the University of Wisconsin elementary education faculty.

Characteristics of WETEP Faculty

WETEP faculty are expected to possess and demonstrate the characteristics required of the graduates of the WETEP program.[1] These essential characteristics fall into two domains: (1) those of responsible citizenship and (2) those of effective professional teachers.

Yee identifies those characteristics required of concerned, responsible citizenship for the future as:

1. Values-oriented rather than material-oriented.
2. Sensitive and reactive to continuing social problems.
3. Sufficiently people-oriented and skilled in group relations to meet the demands of high population densities, of increased international and regional travel and trade, and of relations with culturally different people.
4. Creative in the use of leisure time.
5. Involved in occupational roles, especially those of a specialized service nature, demanding more education and greater mental and intellectual competencies.
6. Sufficiently oriented to scientific-technological developments and processes to appreciate and recognize their contributions and limitations.[2]

Tabachnick and DeVault describe roles of effective professional teachers of 1975 as:

1. Modeling behavior
2. Instructional guidance

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[1] B. Robert Tabachnick and M. Vere DeVault, "Teacher Roles for 1975," WETEP, Vol. I: Position Papers, School of Education, University of Wisconsin, Madison, Wisconsin, 1969.

[2] Albert H. Yee, "Preparation for the Future," The Social Studies, January, 1968, p. 25.

3. Management and administration

4. Information transmission[3]

While past and present school programs are strongly oriented toward (3) management and administration, and (4) information transmission as the dominant teacher roles, it is hypothesized that these will not be of the greatest importance to effective teaching in the years ahead. WETEP is designed to utilize, in addition to those above, (1) modeling behavior and (2) instructional guidance as the dominant roles in the school curriculum which emphasizes personalization of instruction. The WETEP cybernetic system permits the shifting of roles to fit the needs of individuals as well as the demands of society's temporary and sustained issues and problems. Thus, goals and changing emphases to satisfy changing societal forces will be the pattern of WETEP's program.

Present-day analysis of our country's diverse goals as reflected by the people and the action of government requires that educational programs continue to generate the unique contribution of each person while harnessing the force of groups through effective social interaction. Each faculty member cannot be expected to possess all the stated characteristics or assume a functional contribution to all aforestated roles. It is not unreasonable to assume, however, that the WETEP educational design makes each and every participant aware of the multiplicity of roles needed. Each participant may then work both individually and with teams or group arrangements to consistently tap the generative professional thoughts of colleagues working throughout WETEP.

The new and unique characteristics and roles of the WETEP faculty and the crucial relationship of these roles to the successful implementation of WETEP makes comprehensive, effective faculty in-service education an absolute necessity. Our present knowledge of human behavior indicates that both affective and cognitive aspects of behavior be treated as a consistent whole. To attain this consistency, the framework for faculty in-service education is structured upon five components, each of which is both a cognitive and affective contributor.

Faculty In-Service Education Participants

Teaching Faculty. There are several populations for which faculty in-service education activities are planned. The first population, and the one which is recognized as being the crucial one, is the WETEP faculty: that faculty which has participated from the outset in the design of WETEP and will continue to provide direction for WETEP as a viable force in teacher education on the Wisconsin campus. It is recognized that the difference in faculty role between planning and effective implementation is great. It cannot be assumed that a faculty which has demonstrated their commitment and ability to cooperatively envision and create a new design for teacher education also possesses all the characteristics essential for successful implementation of the program. A great deal will need to be done to help faculty understand the totality of an implemented WETEP and their own roles as WETEP faculty. It is recognized that this will be no easy task. On the contrary, this task may prove to be one of the most difficult of the many undertaken or yet to be undertaken in the building of WETEP.

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[3] B. Robert Tabachnick and M. Vere DeVault, op. cit.

The second population of in-service education participants includes the graduate assistants and instructors who work in WETEP. The differentiated staff which will be required for WETEP implies the use of many staff persons with a variety of professional skills. In-service education for these persons must be of a form concentrated both in time and in focus.

Visiting Participants. Faculty in-service education will be provided also for those visiting staff members from other teacher education programs. Some of these faculty members will be anticipating return to their own campuses where they will implement part or all of the WETEP concept; others will expect to return to more traditional programs in which they are able to implement only selected WETEP ideas, and still others will function as change agents responsible for the improvement of teacher education programs on their own campuses.

Finally, a special international in-service emphasis will provide facilities and experiences designed for teachers from other countries--particularly the underdeveloped countries. Faculty members from the School of Education and from throughout the University of Wisconsin have in recent years been involved in educational programs in India, Nigeria, Korea, and elsewhere. Contacts such as those which have been developed in these educational programs have made U. S. study programs useful to teacher education programs in these countries. WETEP may be expected to provide a special service in this respect through the use of major portions of the faculty in-service education program.

International in-service emphasis is designed to acquaint the staff with new environmental situations in which WETEP may be operative. This emphasis may be provided in several directions. It is anticipated that some outstanding educators from other countries responsible for the preparation of elementary teachers will visit the University of Wisconsin and view the program as observers over an extended period of time. They will discuss with the WETEP staff the application of WETEP philosophy, operations, and procedures, and its application to a foreign environmental setting. It is also assumed that a program of study and participation, over an extended period (one or two years), will be provided for foreign educators from many countries who are responsible for preparation of elementary teachers. To guarantee the maximum in-service profit from this interchange, it is proposed that some members of the WETEP staff visit schools in other countries and participate in conferences, seminars, etc. To the extent possible within the optimum development of WETEP, these periods of acquaintanceship and responsibility in foreign countries may be extended or repeated from time to time.

Components of Faculty In-Service Education

Personal-Professional Human Interrelationship. A crucial faculty role is that of developing in WETEP students appropriate skills in human relations. Specific responsibilities required of WETEP faculty members include the ability to help students:

1. Clarify goals and values,

2. Develop competence in the direction of small group activities, and

3. Develop competence in instructional conferencing.

While each of these responsibilities clearly has a cognitive base, each is also concerned with the more personal or affective aspects of teaching.

Because of the significance attached by the WETEP staff to the development of effective human relations skills, each staff member should be given the opportunity to develop insight into his own interpersonal professional relationships, and into the ways in which these relationships may be continually improved. The following in-service opportunities are proposed:

1. A faculty personal-professional-private profile service will be initiated by each participant. This service will include information about prior experiences, personal behavior related to professional involvement such as dialect, personal-professional interests, related activities, general education strength and limitations, recognized competencies, teaching style identification and personal-professional developmental activities. This dynamic profile is to be private and available to others only with the approval and consent of each individual faculty member.

2. Effective participation in the WETEP program will require long-term commitments of faculty members. Each will be encouraged to make consecutive five-year plans for active involvement in WETEP. Through coordination of many personal five-year projections of participation plans, opportunities for professional growth will be designed. These plans will include both individual and group activity. These initial projections and continuous revisions are to be available to other WETEP faculty members for the purpose of coordinating potential cooperative activities.

3. Sensitivity sessions will be provided for faculty members as a part of the professional involvement with the affective aspects of human interaction. These sensitivity sessions will focus on the forces within our society such as involvement with various ethnic groups, class struggle for recognition, and special groups. They should result in increasing the faculty member's sensitivity to the individual students. Because of the importance of seminars in the WETEP program, special study of group dynamics will also be a part of the faculty in-service program.

Professional Knowledge and Skill

Complete familiarity with the instructional facilities available to WETEP students is essential if each faculty member is to competently discharge his responsibility to assist students in efficient utilization of available resources. It is essential that WETEP faculty be familiar not only with the knowledge pertinent to their areas of specialization and with the instructional facilities available to WETEP students but also with the over-all pattern and principles of WETEP operation. It is sometimes difficult to distinguish between knowledge about a given topic, and the facility for developing competence in that topic, because of the emphasis in WETEP upon parallel means and ends. (For instance, the use of media in the program is designed to make a substantial contribution to the student's understanding of the use of that media with elementary students.) The medium is the message in much of WETEP.

A systematic plan for the acquisition of information concerning the elementary school will provide a continuous flow of information to WETEP staff. This plan will include information from state offices of public instruction, representative samples of school systems, curriculum directors, federal education projects, research and development centers, and commercial materials such as texts, films, and other objects. Additional activities will include field trips, and phone and personal contacts with state, federal and local departments of public education. The University of Wisconsin with its comprehensive Instructional Materials Center will provide the base for acquiring and disseminating this information about various curriculum materials and activities in the elementary school.

WETEP is designed to use technology in a way which facilitates faculty focus on the more humanistic aspects of instruction. This does not mean that the faculty will have no association with technology. It means that technology will serve the faculty; not that the faculty will serve technology. If this appropriate relationship is to be developed, faculty will need thorough understanding of technology and its role in WETEP. Time will need to be provided for the faculty to become familiar with the developing technological support as it serves the program in various ways. Equally important is faculty knowledge of technology available for WETEP but not currently a part of WETEP. To select the appropriate medium or the appropriate computer program design requires a familiarity with available media and a variety of program options.

Faculty visits will be planned to other educational and training sites and to regional and national meetings at which technology developments in education are topics of concern. Semester leaves will be planned for faculty interested in working at other agencies, organizations and institutions where technological developments have implications for WETEP. The most important in-service activity, however, will be provided from within WETEP by those faculty responsible for the technological developments within the program, their implementation in instruction, and their appropriate utilization by faculty and students.

New instructional patterns throughout the educational community require entirely new assessment patterns. WETEP may serve as a prototype to meet the requirements which confront education today, requirements which may be expected to emerge in new dimensions in the decade ahead. As new assessment ideas and instruments develop, the faculty will need to understand their nature and use in the WETEP instructional program. At the same time, assessment requires a close relation to objectives and instructional strategies which, in WETEP, are dependent upon faculty competence. Thus, the understanding of assessment strategies developing within and without WETEP is an essential faculty responsibility.

Analysis, Assessment and Continuing Development of WETEP

The WETEP concept is viable only as a program which is continuously in the process of becoming. Nothing is more repugnant in education at the present than those instances in which innovation has resulted in a finished product useful for a while and then discarded as obsolete. The systems approach to WETEP encourages a continuous regeneration of various elements, modules and events within the system.

As a part of the WETEP research facility a constant flow of data will be made available. What data flow from the system and what is done as a result of the availability of those data is dependent upon the competence and receptivity of the WETEP faculty. Constant and continuous attempts to project the future potential of WETEP, to analyze present successes and limitations, and provide direction for the development of new modules, new organizations, and new faculty-student relationships will require a faculty which is ever changing their own perceptions of what WETEP can and should become. Such continued faculty growth will require time for study and contemplation, time for travel and visitation throughout the country, and time for thoughtful interaction among WETEP faculty required to maintain valid instructional relationships throughout the operating program.

In-Service Activities and Resources

The activities which must be planned and the resources which must be made available fall into four major categories: seminars, individual study, counseling, and intern participation. While each of these activities may not be spread equally among the four kinds of faculty in-service education participants, it is anticipated that for the WETEP faculty, for the teaching assistants, for visiting faculty and for visiting international teacher educators, each of the activities will be an integrated segment of the available professional educational opportunities.

Seminars. Organizational plans which involve differentiated staff require substantial amounts of time devoted to planning of instructional activities. Through these planning sessions the WETEP faculty will become increasingly acquainted with the total WETEP program. In addition to these planning sessions considered to be a part of the WETEP operational program, faculty seminars are planned which make possible in-depth study of the continuing development of WETEP. These seminars take the faculty out of the day-to-day instructional operation and provide opportunities to extend horizons. Data for these seminars are provided from developing ideas and projects throughout the country, from the WETEP Futuristics Center,[4] and from consultants brought to the faculty seminars for the study of specific topics related to the continuing improvement of WETEP. These seminars are planned specifically with the WETEP faculty in mind.

In addition to the WETEP faculty seminars, seminars are provided to acquaint teaching assistants with their roles within the WETEP instructional program. They, too, must understand more of the total program than their own immediate responsibilities, and the seminars are designed to facilitate both better acquaintance with their specific tasks, and acquaintance with the total program. Seminars will need to be planned for each of the differing visiting faculty groups from other insitutions. Those whose stay on the Wisconsin campus for a semester or less will need a different kind of seminar assistance than those planning to remain for a year or more. These latter visitors will be expected to contribute substantially to the instructional staff as interns, whereas visitors for a semester or less will serve largely as participant-observers within the WETEP program.

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[4] John M. Kean, "Future-Planning on Teacher Education in WETEP," WETEP Feasibility Study, Vol. V: Program and Support Systems.

Individual Study. Time will need to be provided for individual study on the part of all who participate in the faculty in-service education program. Study topics will be selected with regard to the components of the faculty in-service education program as indicated above. Library resources, travel funds, and faculty leave will facilitate this individual study. The coordinator of faculty in-service education will provide assistance as needed in the planning and implementation of individual study programs.

Counseling. Changes in instructional patterns on university campuses have been minimal in the past. Frequently, faculty resistance to change is cited as the single most significant factor in preventing substantive change and improvement in instructional practice or organizational plan. The two-and-a-half year planning period which has preceded major implementation of WETEP may be expected to have made a significant contribution to preparing faculty psychologically for the change required in their roles.

The requirements for continuing change in faculty roles as the program is initiated over a five-year period call for special attention. As the program reaches full operation, the continuous feedback from within the system and from social and professional forces outside the system will indicate continuous changes to be made in the program. Changing university environments and university faculty will require assistance from all available sources. Psychological and psychiatric assistance will be provided to help faculty understand their personal problems in meeting the requirements of new roles and responsibilities.

The Participant-Observer and the Intern. The WETEP instructional faculty is designed to include a variety of individuals with a variety of skills. The WETEP faculty responsible for the development and implementation of the program provide the central source of instructional planning and support. They will be substantially supported by competent teaching assistants, by instructors, or by classroom teachers on leave from the schools who will assume relatively restricted and well-defined roles within the program. It will be important that in-service education for these classroom teachers be directed to their specific roles moving them rather rapidly from participant-observer to instructor.

Visiting faculty from other colleges and universities will likely serve as participant-observers in a variety of roles throughout the program before they become interns to serve more diversified roles throughout the program. If these visitors are to understand the total program, and if they are to be in a position of improving their programs at home either with or without much of the WETEP support, an understanding of the total program is important.

As the major function of their activities, international teacher educators may be expected to perform roles as participant-observers. Careful assistance will be given those for whom intern activities seem to be appropriate both in terms of their own interests and in terms of the interests of the WETEP student. It may be expected that very special contributions can be made by these international teacher educators in intern roles. What these contributions may be will depend upon the very special qualifications of the individuals involved and will be the outgrowth of continued interest and investigation on the part of those staff members specifically interested in international teacher educators in intern roles.

Participation in WETEP by international teacher educators would assist staff in analyzing the application of the principles and philosophy of WETEP to a variety of environmental settings. It would also provide staff development evolving from a more comprehensive understanding of the thinking of persons with new and/or different perspectives on education in the area of elementary teacher preparation. To the extent that it is possible for staff to view and participate in the educational considerations and responsibilities of other countries, the critical analysis of the value of other practices will bring an added insight to the future development of WETEP.

Benefits of Faculty In-Service Education

The unique nature of WETEP with new faculty roles makes imperative an in-service education facility. It is possible that a new total structure will be developed for teacher education in which new media and technology are used, in which new systems approaches are applied, in which new building facilities are provided, but in which faculty perform in the same manner to which they have been long accustomed. If that happens, all of WETEP fails. Indeed, there is no aspect of WETEP having more importance than faculty in-service education.

Benefits to Elementary Pupils. WETEP is designed on the assumption that prospective teachers will learn to model instructional behavior after that which they observe and experience in their teacher education program. If these model behaviors are to be exhibited, an effective in-service education program will be required. If competent teacher behavior, appropriate for personalized instruction, is to emanate from WETEP to the schools, then faculty behavior must be exemplary. Individualized programs in elementary schools need models of teacher behavior designed to provide valuable conference and seminar interactions. Only as faculty demonstrate these interactions in the most meaningful way, can WETEP students be expected to demonstrate such interactions with elementary school pupils.

Benefits to Higher Education. WETEP provides an innovation on the University of Wisconsin campus which is unique not only to education but to other disciplines as well. A noted characteristic of teacher education at Wisconsin is its broad university-wide support. WETEP has enjoyed both professional and financial support from throughout the campus, and a wide campus audience may be expected to review the merits of WETEP in operation. If competent faculty is to be performing the required WETEP roles with relative ease, faculty in-service education is essential. Effective performance of the new roles is the best assurance of continued support throughout the campus, and, indeed, of the implementation of some WETEP ideas in other disciplines.

Benefits to the Profession. Visitors on campus and reports to national, regional, and state meetings will provide the profession with many opportunities to become acquainted with both the successes and the continuing problems associated with WETEP. The best assurance of effective representation to the profession at large is a faculty made competent in assuming their required WETEP roles through in-service education, and confident of that competence. As visiting faculty join the WETEP staff and participate in in-service education and then return to their respective campuses and countries, they serve also as able reporters of the Wisconsin Elementary Teacher Education Program.

Benefits to Other Campuses. WETEP is designed for partial or complete implementation on other campuses. The direct impact of faculty roles on the success of WETEP requires that faculty on other campuses prepare themselves carefully for the implementation of such a program. The faculty in-service education program provides a ready service for these staff members. Through observation, participation in the program, seminars, internships, and other in-service study, these faculty can become highly competent to implement aspects of WETEP on their own campuses.

Benefits to International Teacher Education. The opportunity provided those responsible for teacher education in other countries to participate in the in-service activities of WETEP should generate a substantial impact in their respective countries. Although the readiness to adopt or adapt WETEP ideas varies considerably from one country to another (England vs. Korea, for example) both the processes used in the development of WETEP and the products flowing from that development have implications for development in other countries. Mere observation of WETEP by these international visitors would inadequately serve their purposes. Participation, however, in a variety of ways through the faculty in-service education program, provides them with an understanding of the program essential to their appropriate dissemination of the ideas in their own countries.

Benefits to WETEP Students. Most important of all are the benefits to be derived by the WETEP students in the program. Students have too often been the recipients of instruction by faculties whose major interests lie in research or service activities rather than in instruction. When major faculty interests have been in research and service, faculty expertise has tended to be in these areas. WETEP requires a commitment of faculty to students and their learning problems and programs. The in-service education program will be designed to assist faculty members in the development of increased expertise in their roles with students.

AN ANALYSIS OF TECHNOLOGICAL FACILITIES REQUIREMENTS FOR WETEP

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Introduction

The objective of this report is to provide insight into the nature of the problems and prospects for the facilities required in the implementation of WETEP. Although in the development of this report a great number of problems have been identified, they may be expected to be only illustrative of the many which will be met if WETEP implementation proceeds. Similarly, the nature of suggestions for the resolution of many of these problems can be considered only illustrative of the alternatives which may be considered once development is begun.

The design for the WETEP program requires instructional facilities not currently found in most programs in higher education. The task of identifying facilities needs and projecting ways in which these needs may be met as WETEP develops was a major task of the feasibility study and is presented in this paper. This particular report is designed to identify time and space requirements for the implementation of the WETEP instructional program, and to outline the demands which may be expected to be placed upon the learning resources available in WETEP. It is expected that films and video tapes will be an important instructional resource; this paper has identified alternative means for the storage and presentation of these sound motion pictures. The paper also explores alternatives and costs of student access modes to audio-visual materials and discusses a universal terminal concept which may be expected to contribute significantly to the instructional program. Finally, because of the complexity of the total information management system, an analysis of information system requirements has been made.

The essential requirements for the WETEP instructional system have been identified in the first four volumes of the WETEP report published in March, 1969. Data derived from those reports have provided the initial information for this analysis. Where these data were inadequate for purposes of determining specific requirements, however, several key assumptions have been made. These assumptions have been identified throughout the report.

Program Time and Space Requirements

WETEP Time Requirements by Element and by Instructional Mode.

Much of the numerical data used in the preparation of this report has been drawn from Tables I, II, and III.

Other significant bits of data provided by the program staff include the following:

1. The WETEP program is distributed over two academic years of 32 weeks each.

TABLE I

WETEP ELEMENT TIME ALLOCATIONS
(In Hours)

Elements	A WETEP Basic	B Program Specialist	C In- Service	D Program Material (Tot. Hrs.)	E No. of Modules
Major Content Areas					
Communications	230	185	90	505	21
Mathematics Educ.	80	115	50	245	12
Social Studies Educ.	80	115	50	245	9
Science Educ.	80	115	50	245	22
Subordinate Content Areas					
Art Education	30	135	65	230	19
Music Education	30	65	35	130	10
Physical Education	30	85	45	160	8
Health Education	45	80	40	165	12
Safety Education	20	65	35	120	19
Leisure Education	20	65	35	120	10
Supporting Content Areas					
Screening	7½	-	-	7½	1
Orientation	117	-	-	117	8
Educ. Psychology	113½	170	85	363½	15
Guidance Education	30	135	65	230	4
Media & Tech.	23	85	45	153	9
Curric. & Instruc.	650	100	50	800	12
Special Content Areas					
Early Childhood Education	20	115	50	185	12
Culturally Diverse	20	150	75	245	26
Special Education	20	115	50	185	27
TOTALS	1646	1895	910	4451	256
Educational Policy Studies	96				
Electives	530				
GRAND TOTAL	2272				

TABLE II

TIME TO BE USED IN EACH INSTRUCTIONAL MODE

Instructional Mode	Basic		Specialist	In-Service
	Number of Hours	Per Cent of Time	Number of Hours Available	Number of Hours Available
Personal Interaction				
Conferences	80	5.0	105	55
Seminars (Avg. grp. = 10)	300	18.0	334	103
Large Group (Approx. 25)	42	2.5	2	1
Lab/Clinical	58	3.5	150	114
Sub-Total	480	29.0	591	273
Instructional Resources				
Reading	205	12.5	220	153
Video Tapes	75	5.0	75	67
Films	70	4.0	50	22
Slides	36	2.0	20	20
Audio Tapes	24	1.5	25	20
Interrelated Modes (Slide/Tape)	37	2.0	25	18
Programmed Instruction	64	4.0	53	34
CAI	38	2.0	31	22
Sub-Total	549	33.0	499	356
Field Experiences				
Classroom Observation	97	6.0	101	23
Field Study	35	2.0	132	30
Clinical Experiences	65	4.0	99	38
Sub-Total	197	12.0	332	91
Other Modes				
Laboratory Work	250	15.0	330	97
Independent Study	125	8.0	95	64
Miscellaneous	45	3.0	48	29
Sub-Total	420	26.0	473	190
TOTAL	1646	100%	1895	910
Educational Policy Studies	96			
Electives	530			
GRAND TOTAL	2272			

TABLE III

TALLY OF WETEP "EVENTS" BY TIME RANGES

Type	Time in Minutes								TOTAL
	0-5	6-10	11-15	16-20	21-40	41-60	61-90	90+	
Reading	611	317	51	49	167	276	134	63	1668
Video Tapes	275	26	67	55	284	32	1	-	740
Films	305	231	68	133	208	26	2	-	973
Slide Sets	161	119	63	23	52	21	-	-	439
Audio Tapes	28	2	39	12	18	33	-	-	132
Slide/Tape	-	-	6	6	102	26	-	-	140
P. I.	22	74	204	35	186	51	5	3	580
C.A.I.	189	84	223	29	130	19	-	-	674

2. The anticipated enrollment is 300 full-time students in each annual class, plus a significant number of part-time students, consisting mostly of in-service teachers. For planning purposes, it is assumed that the part-time students represent a "load" on the facilities equivalent to that of 60 additional full-time students in each annual class. (The part-time population might actually consist of 180 people spending about six hours per week, plus 90 additional people spending 12 hours per week over a two-year span.) It has further been assumed that the part-time student load for each annual class is distributed among the three program categories as follows:

   20 equivalent students in Basic Studies,
   20 equivalent students in Specialist Studies, and
   20 equivalent students in In-Service Studies.

3. The instructional activity identified as Educational Policy Studies is designed to take place outside of the WETEP facilities.

4. All full-time students are expected to complete the entire Basic program, and select material from the Specialist category to fill the 530 hours designated for Elective activity.

5. Approximately 50 per cent of the Classroom Observation activity will probably be handled from seminar rooms through television channels.

6. The average size for a seminar group is expected to be about ten.

7. WETEP facilities will be available to students from 8:00 a.m. to midnight, Monday through Saturday, and from 1:00 p.m. to 10:00 p.m. on Sundays.

Determination of Student-Hour Loads for Various Activities. As a first step in planning instructional facilities for WETEP, the number of student-hours to be spent in the various types of activities must be determined. Table IV presents such data for 13 of the 18 basic types of activity listed in Table II. (The activities selected are those that have some direct bearing on the planning of facilities for mediated instruction or data retrieval; it is assumed that such activities as field study, clinical experiences, and laboratory work will take place in suitable areas different from those used to support the basic instructional program of WETEP.)

The data shown in the Hours column of Table IV are simply transferred from Table II. The Load Factors represent the average number of students expected to make use of each item in the designated category. In the case of the Basic program, the load factor of 320 consists of 300 full-time students, plus enough part-time students taking Basic material to be equivalent to 20 additional students. In the case of the Specialist program, the average number of full-time students who can be expected to use each item of instructional material can be determined by multiplying the annual enrollment (300) by the factor 530/1895 (which is the ratio of the number of elective hours provided for each student to the total number of program-hours of available Specialist material), yielding an answer of 84. If we add 20 to this number to represent the full-time equivalent of the part-time students taking Specialist material, we obtain a total Load Factor of 104. Since none of the full-time students are permitted to take the special material in the In-Service category, the load factor for this category is 20, consisting entirely of the full-time equivalent of many more part-time students.

Classification of Instructional Time Periods. From the load data expressed in student-hours in Table IV, it is possible to develop a list of the basic number of student positions or work stations required to support each type of activity, provided there is some estimate of the effective number of hours during which the facilities are available. If the WETEP program were to be operated in a conventional "lock-step" fashion with all students proceeding on essentially identical schedules, the facilities would be needed only for 2272/64 = 35.5 hours per week. This number is useful as the average weekly time investment

TABLE IV

SUMMARY OF STUDENT HOURS PER ANNUAL CLASS IN VARIOUS ACTIVITIES

		Hours	Load Factor	Student Hours
Reading Assignments	Basic	205	320	65,600
	Specialist	220	104	22,880
	In-Service	153	20	3,060
			Sub-Total	91,540
Independent Study	Basic	125	320	40,000
	Specialist	95	104	9,880
	In-Service	64	20	1,280
			Sub-Total	51,160
Total - Reading and Independent Study				142,760
Slides (Still Pictures)	Basic	36	320	11,520
	Specialist	20	104	2,080
	In-Service	20	20	400
			Sub-Total	14,000
Audio Tapes	Basic	24	320	7,680
	Specialist	25	104	2,600
	In-Service	20	20	400
			Sub-Total	10,680
Slide/Tape Sets	Basic	37	320	11,840
	Specialist	25	104	2,600
	In-Service	18	20	360
			Sub-Total	14,800
Total - Audio and Still Pictures				39,480
Video Tapes	Basic	75	320	24,000
	Specialist	75	104	7,800
	In-Service	67	20	1,340
			Sub-Total	33,140
Films	Basic	70	320	22,400
	Specialist	50	104	5,200
	In-Service	22	20	440
			Sub-Total	28,040
Total - Sound Motion Pictures				61,180

TABLE IV (cont.)

		Hours	Load Factor	Student Hours
Programmed Instruction	Basic	64	320	20,480
	Specialist	53	104	5,512
	In-Service	34	20	680
			Sub-Total	26,672
CAI	Basic	38	320	12,160
	Specialist	31	104	3,224
	In-Service	22	20	440
			Sub-Total	15,824
Total - Interactive Instruction				42,496
Seminars	Basic	300	320	96,000
	Specialist	334	104	34,736
	In-Service	103	20	2,060
			Sub-Total	132,796
TV Classroom Observation (50 Per Cent of Total Observation)	Basic	48	320	15,360
	Specialist	50	104	5,200
	In-Service	12	20	240
			Sub-Total	20,800
Total - Seminars & TV Classroom Observation				153,596
Large Group	Basic	42	320	13,440
	Specialist	2	104	208
	In-Service	1	20	20
			Sub-Total	13,668
Total - Large Group Instruction				13,668
Conferences	Basic	80	320	25,600
	Specialist	105	104	10,920
	In-Service	55	20	1,100
			Sub-Total	37,620
Total - Conferences				37,620

expected of each student. However, it cannot be used directly for the planning of facilities because WETEP is definitely not a rigidly-scheduled "lock-step" program. While there are certain schedule constraints imposed by seminars, conferences, and large-group activities, the students will generally be working as individuals or in very small groups during time periods that are primarily of their own choosing.

As noted earlier in this report, the WETEP facilities will be available to students between the hours of 8:00 a.m. to midnight, Monday through Saturday, and from 1:00 to 10:00 p.m. on Sundays. These periods provide a total "use time" of 106 hours per week (or 6784 hours during a two-year span), but it is not realistic to use these numbers directly in determining the requirements for student positions, because not all of the available periods are of equal usefulness. What is needed is a means of applying weighting factors to various time periods in order to determine a reasonable number corresponding to the effective hours that facilities are available. To solve this problem, a technique borrowed from the broadcast industry can be used to classify various time periods in terms of their relative attractiveness. (The focus here, of course, is the attractiveness of time periods for students engaged in serious study; the broadcaster's classifications are based instead on attractiveness for commercial sponsors trying to reach large audiences.)

The time classifications used for purposes of this study are as follows:

Class A:	Monday through Friday, 9:00 a.m. to noon, 1:00 to 4:00 p.m.
Class B:	Monday through Friday, 8:00 to 9:00 a.m., 4:00 to 6:00 p.m.; Saturday, 9:00 a.m. to noon.
Class C:	Monday through Friday, noon to 1:00 p.m., 7:00 to 10:00 p.m.; Saturday, 8:00 to 9:00 a.m., 1:00 to 4:00 p.m.
Class D:	Monday through Friday, 6:00 to 7:00 p.m., 10:00 p.m. to midnight; Saturday, noon to 1:00 p.m., 4:00 p.m. to midnight; Sunday, 1:00 p.m. to 10:00 p.m.

In planning the facilities to be used for individualized instruction, we shall assume that all four time categories are useful, but that they are weighted in accordance with the factors shown in Table V.

TABLE V

EFFECTIVE HOURS PER WEEK FOR INDIVIDUALIZED INSTRUCTION FACILITIES

Time Class	Actual Hours Available	Assumed Relative Popularity (Probable Utilization)	Effective Hours
A	30	100%	30.0
B	18	75%	13.5
C	24	50%	12.0
D	34	20%	6.8
		TOTAL	62.3

Learning Space Requirements. A preliminary indication of the number of student positions required to support the various activities could now be determined by dividing the total load in student-hours in each activity by the total number of effective hours during an academic year. More realistic data can be obtained, however, by applying an additional "peak demand" factor of about 1.33. It is not realistic to assume that the demand on the facilities will be completely uniform, since there will inevitably be peaks and lulls around the average level. The suggested "peak demand factor" of 1.33 is only an educated guess, but it is consistent with experience in other applications of communications technology where random information patterns are fitted into fixed communication channels. Thus, it is recommended that the student-handling capacity of each WETEP system be 33 per cent greater than the average requirement during Class A periods.

For example: Instead of calculating the number of student positions required for reading as follows:

$$\frac{91{,}540}{62.3 \times 32}$$

a more realistic estimate can be derived by including the "peak demand" factor:

$$\frac{91{,}540 \times 1.33}{62.3 \times 32}$$

It is important to note that although the total effective hours figure can be used for all individualized instruction facilities, it is unlikely that any but Class A and B time could be utilized for seminars, large group instruction, and conferences. Similarly, only Class A time could be used for classroom observation via TV in seminar rooms. For these latter two types of activities, then, the effective times will be 40.8 and 30.0 hours, respectively (see Table VI).

TABLE VI

EFFECTIVE HOURS PER WEEK FOR CONFERENCES AND GROUP ACTIVITIES

Time Class	Actual Hours Available	Assumed Relative Popularity (Probable Utilization)	Effective Hours
A	30	100%	30.0
B	18	60%	10.8
		TOTAL	40.8

Results of these computations are shown in Table VII.

Interpretation of Required Learning Spaces

1. The student positions listed in Table VII can account for the whereabouts of a maximum of 414 students at one time; the remaining 306 students needed to account for the total WETEP student population of 720 must be either temporarily inactive or engaged in activities other than those listed in Table VII. (It is important to note that the average weekly time investment required of each student is 35.5 hours, and that he is free to spread this activity over the 106 hours during which WETEP facilities are available to him.)

2. Suitable spaces for reading and independent study might consist of either reading positions at library tables or so-called "dry carrels"--private study cubicles with no provision for electronic equipment. If it is assumed that programmed instruction implies the use of books and paper-based exercises, we can group the 18 spaces required for programmed instruction together with the 97 required for reading and independent study, giving a total of 115 "dry carrels" (or equivalent study spaces) required to support the WETEP program. In the preparation of Table VII, however, the requirements for programmed instruction were grouped with those for computer-assisted instruction (CAI) because it is assumed that what is desired in both

TABLE VII

LEARNING SPACES REQUIRED FOR VARIOUS ACTIVITIES
(Rounded off to next highest whole number)

Reading	(91,540 x 1.33)/(62.3 x 32)		=	62
Independent Study	(51,160 x 1.33)/(62.3 x 32)		=	35
Sub-Total for Paper-Based Activities		97		
Slides	(14,000 x 1.33)/(62.3 x 32)		=	10
Audio Tapes	(14,680 x 1.33)/(62.3 x 32)		=	8
Slide/Tape Sets	(14,800 x 1.33)/(62.3 x 32)		=	10
Sub-Total - Still Pictures and Audio		28		
Video Tapes	(33,140 x 1.33)/(62.3 x 32)		=	23
Films	(28,040 x 1.33)/(62.3 x 32)		=	19
Sub-Total - Sound Motion Pictures		42		
Programmed Instruction	(26,672 x 1.33)/(62.3 x 32)		=	18
CAI	(15,824 x 1.33)/(62.3 x 32)		=	11
Sub-Total - Interactive Instruction		29		
Seminars (Class A & B time)	(132,796 x 1.33)/(40.8 x 32)			136
TV Observation in Seminar Rooms (Class A time only)	(20,800 x 1.33)/(30 x 32)		=	29
Sub-Total - Use of Seminar Rooms		165		
Large Group Instruction (Class A & B time)	(13,668 x 1.33)/(40.8 x 32)		=	14
Conferences (Class A & B time)	(37,620 x 1.33)/(40.8 x 32)		=	39
	GRAND TOTAL			414

cases is a highly interactive type of learning experience. It is quite possible that technical progress during the next several years will blur the distinction between CAI and programmed instruction; there may well be technological aids which provide highly interactive learning experiences with automatic scoring and record-keeping at substantially less cost than today's CAI techniques. It is recommended, therefore, that any carrels or study spaces initially set up to implement programmed instruction be designed in such a way that electronic instruments might be installed in them at some later time.

3. If it is assumed that a significant portion of the reading and independent study required of WETEP students is to be handled in student residences or the university's main library, the number of "dry carrels" provided in the WETEP building could be somewhat reduced.

4. Individual use of audio-visual media will require the use of "wet carrels", which provide for the use of projectors or electronic instruments. As indicated in Table VII, 42 such carrels are required for the use of sound motion pictures (stored on either video tape or film), and 28 additional carrels are required for still pictures and audio materials. Later sections of this report will examine the relative merits of small audio-visual playback devices mounted within the carrels versus remotely-controlled equipment connected to the carrels through dial-access telecommunication systems.

5. Assuming that the average size of a seminar group is ten students, it appears that 17 seminar rooms will be required.

6. A single large group classroom seating about 30 students should be sufficient for the WETEP program. If the average number of students in a large group is 25, the single room would actually be in use only 14/(25 x 1.33) = 42 per cent of the time during Class A periods.

7. The final entry in Table VII showing 39 student positions as the requirement for Conferences is probably valid if WETEP students are given the opportunity to request conferences at times most convenient to themselves. It seems more likely, however, that most conferences will be scheduled to suit the convenience of faculty members, and that the "effective hours" for such conferences will conform to a conventional 40-hour work week. Under these conditions, the 1.33 "peak demand factor" could be dropped, and 40 used instead of 40.8 as the number of effective hours per week. The required number of student positions for conference activity then becomes 30 instead of 39. These student positions might consist of conference rooms or suitable areas in faculty offices.

8. If it is assumed that the term conference implies a private meeting of a student with a faculty member, it follows that the equivalent of 30 full-time faculty members will be required for

instructional guidance and evaluation. This work might actually be handled, of course, by a larger number of faculty members spending only a part of their time in conferences with students. Dividing the total number of student-hours of conference activity shown on Table IV (37,620) by the equivalent number of full-time students in each annual class (360), gives an average time spent by each student in conferences of 104.5 hours throughout the two-year program, or an average of 104.5/64 = 1.63 hours per week. If some conferences are not on a one-to-one basis, the number of faculty members required to conduct them may be correspondingly reduced. If, for example, every other conference attended by a student involves another student as well as a professor, the number of equivalent full-time faculty members required to support this activity can be reduced from 30 to 20.

9. If facilities to support the WETEP program are installed in line with the recommendations shown in Table VII, the "efficiency factors" shown in Table VIII may be expected.

10. Minor misjudgments in the planning of facilities for the WETEP program (whether from faulty input data, inappropriate assumptions, or other causes) should not have a serious negative effect on the program, since the normal result would be automatic adjustments in the relative popularity factors for the various time periods. If students learn, for example, that they experience excessive waiting time to get on a CAI terminal during Class A time but can count on finding idle terminals during Class C or Class D hours, it might be expected that many students will find it possible to make more use of the "off peak" hours. In fact, an attempt could be made to improve the efficiency factors for the various facilities by deliberately limiting the numbers of student positions in order to force more uniform utilization of the various time periods.

Scheduling Factors and Demands on Learning Resources

Introduction. If the WETEP program were completely random in its operation (to the extent that students enter and leave the program at random dates, and are subjected to no scheduling constraints), the use of any one item of Basic material would be spread out throughout the year, and would be accessed at an average rate of only twice a day. (This is determined by noting that there are 640 equivalent Basic students on the campus at any one time, each of whom spends a total of 5 x 32 x 2 = 320 days in WETEP on a 5-day-per-week basis; any one item of "basic" material would thus be used at an average rate of 640/320 = 2 times per day.) Under these same conditions, each item of Specialist material would be requested at an average rate of 208/320 = 0.65 times per day (or once every 1.54 days), and each item of In-Service material would be requested at an average rate of 40/320 = 0.125 times per day (or once every 8 days). If the program actually operated on this completely random basis, it would be

TABLE VIII

PROBABLE EFFICIENCY FACTORS FOR WETEP FACILITIES
(Per Cent of Full Utilization)

(a) Facilities for Individualized Instruction

Class A Time: 100% during periods of peak demand; Average of 75% for all of Class A time.

Class B Time: 0.75 x 0.75 = 56.3%

Class C Time: 0.75 x 0.50 = 37.5%

Class D Time: 0.75 x 0.20 = 15%

(b) Conference Space (assuming use of 39 student positions)

Class A Time: 100% during periods of peak demand; Average of 75% for all of Class A time.

Class B Time: 0.75 x 0.60 = 45%

Class C and D Time: 0%

(c) Seminar Rooms (including use for observation via TV)

Class A Time: 100% during periods of peak demand; Average of 75% for all of Class A time.

Class B Time: 0.75 x 0.60 x (136/165) = 37%. (NOTE: Use for television observation limited to Class A time.)

Class C and D Time: 0%

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difficult to justify placing any instructional material "on line" through electronic facilities involving significant capital investments, since it is not reasonable to make major investments simply to achieve rapid access to infrequently-used resources.

At the opposite extreme, if WETEP were rigidly structured for each annual class in "lock step" fashion, each item in the Basic category would be needed "on line" for only one day per year, and would be used by 320 students during that day. Under these conditions, it would be economical to use electronic distribution facilities, but it would probably be necessary to put most items on a scheduled basis, rather than a random-access basis, to avoid excessive waiting periods.

Under traditional university practices, the degree of regimentation in academic programs is seldom as great as that implied by the preceding paragraph, but it is not uncommon to find programs so structured that many items of instructional material are used by all Basic students during the span of one week. If this degree of schedule control were applied to WETEP, the average access rate for each item of Basic material would be 320/62.5 = 5.12 requests per Class A hour. As will be shown presently, this degree of regimentation corresponds approximately to a "worst-case" situation for WETEP, but is certainly not typical.

From the data now available, it appears that four major scheduling constraints will contribute to "bunching" of WETEP student activities, which will in turn lead to peak demands on the resources and facilities. These constraints are: (a) the high probability that most students will enter and leave the program at the beginning and ending of the traditional academic terms (for reasons related more to the outside academic world than to WETEP itself), (b) certain restrictions that must be imposed on the selection of modules, since some modules are prerequisites for others, (c) the need for providing some degree of organization or optimum sequencing of learning experiences within each module, and (d) the need for students to participate in seminars and occasional large-group activities. A meaningful seminar is possible only if there is a small group of students, perhaps eight to twelve, working on the same instructional material at about the same pace, so that their activities can reasonably converge at the seminar period.

Concept of the Learning Unit. Although detailed knowledge of the scheduling practices that will actually be followed in the future operation of WETEP is not available, reasonable forecasts can be made for facilities-planning purposes by further processing of the data contained in Tables I, II and III in accordance with a few additional assumptions.

To simplify this analysis, the concept of the "learning unit" has been developed. The learning unit corresponds to the amount of material the student normally assimilates between his basic "decision points" in working through each subject area. In a traditional university program, the learning unit is usually the course, and the student reaches basic decision points where he can adjust his program only at semester intervals, or approximately every 16 weeks. In WETEP, the decision points are much more frequent and the learning units are correspondingly much shorter. For facilities planning purposes only, a learning unit is assumed to be equivalent to two days of study (or an average of 14.2 hours) on a full-time basis. It shall be further assumed, however, that a student normally distributes the effort required for a learning unit over an interval of two weeks, and that he makes use of five different learning units during each two-week period.

In a very superficial way, we can liken WETEP to a traditional university program in which each semester is only two weeks long--every two weeks, the student has an opportunity to register for a new group of five courses. This analogy is only superficially valid, of course, because the student is actually free to make decisions about new learning units at any time. Every two days, on the average, he completes one learning unit and selects another. To simplify the analysis, however, the academic year has been arbitrarily divided into a series of two-week periods.

The detailed pattern of learning units used for an analysis of scheduling problems is presented in Table IX, which represents an adaptation of the more precise data in Table I. The numbers of learning units for each subject area were determined by dividing the time allocations by 14.2 and rounding off to whole numbers in such a way as to preserve an average learning unit length of 14.2 hours. The learning units are roughly comparable to the modules as listed in Table I, but the module could not be used directly for this analysis because each module, as defined for WETEP purposes, may include instructional materials in all three categories--Basic, Specialist, and In-Service. Roughly speaking, a learning unit is comparable to that fraction of the material within a module used by a student in a single category. The Assumed Guidelines cited in Table IX were developed only to provide a rational basis for projecting a statistical picture of probable demand on WETEP resources and should not be interpreted either as recommendations or as actual constraints that will be applied in the future operation of WETEP.

The distribution of learning units in a typical WETEP student's two-year program is shown in Table X. Note that the total number of learning units accounted for during each two-week period is five. In spite of the fact that each WETEP student will have far greater control over his own program than the usual university student, we can expect that most student programs will actually conform to a general pattern similar to that shown here. It is obvious, for example, that the Input units (Screening and Orientation) should be used near the beginning of the program and the Output units (Curriculum and Instruction, with emphasis on clinical experiences) should come toward the end. It is also reasonable to expect students to complete their Basic work in each subject area before proceeding with Specialist topics, and it follows that the Basic work must be concentrated during the beginning of the program so as to allow later time for the specialized work. In the special case of Communications, so much basic work is required

TABLE IX

ASSUMED SUBDIVISION OF WETEP INTO "LEARNING UNITS"
(For Facilities-Planning Purposes Only)

NOTES:
1. Average learning time per unit is 14.2 hours.
2. Typical student uses five units every two weeks.
3. "Period" in this table designates a two-week interval.

Element or Classification	Basic Units	Specialist Units	In-Service Units	Assumed Guidelines (not necessarily rigid)
Input/Output Processing				
Screening	1	-	-	Used during first period.
Oreintation	8	-	-	Must be completed during first four periods.
Curriculum and Instruction	46	7	3	Used during second year only, heavy emphasis during periods 22-32; first four units in basic series have fixed sequence; remaining basic units organized in four series.
Educational Psychology	8	12	6	Basic units must be used during first eight periods in fixed sequence; six of the 12 Specialist units suitable for first-year use after Basic material is completed.
Communications	16	13	6	Basic units must be completed during first year; first eight Basic units in fixed sequence, balance of Basic units in ordered pairs; Specialist material normally used in second year.

TABLE IX (cont.)

Element or Classification	Basic Units	Specialist Units	In-Service Units	Assumed Guidelines (not necessarily rigid)
Other Major Content Areas				All Basic units must be completed during first 12 periods; Basic units are in fixed sequence for each subject, but subjects may be interleaved; four Specialist units in each subject are suitable for first-year use after Basic units are complete.
Mathematics Educ.	5	8	4	
Social Studies Educ.	5	8	4	
Science Educ.	5	8	4	
Sub-Totals	15	24	12	
Minor or Special Content Areas				At least 12 of the 23 Basic units must be completed during the first year, the balance not later than Period 24; Basic material for each subject in fixed sequence; 24 of the 76 Specialist units are suitable for first year use after completion of the related Basic material.
Art Education	2	9	5	
Music Education	2	5	2	
Physical Educ.	2	6	3	
Health Education	3	5	3	
Safety Education	2	5	3	
Leisure Educ.	2	5	2	
Guidance Educ.	2	9	5	
Media & Tech.	2	6	3	
Early Childhood Education	2	8	4	
Culturally Diverse	2	10	5	
Special Education	2	8	4	
Sub-Totals	23	76	38	
Educational Policy Studies	7	-	-	Because this activity is outside WETEP facilities, it does not precisely fit the "learning unit" concept. Nevertheless, student time is allowed for it at the rate of four and three units for the first and second years, respectively.
Grand Total	124	132	65	

NOTE: Typical student has the opportunity to use only 36 of the available 132 Specialist units.

TABLE X

DISTRIBUTION OF HYPOTHETICAL "LEARNING UNITS" IN A TYPICAL WETEP STUDENT'S PROGRAM

	Basic Units						
Student Period	Input or Output Units	Ed. Psych.	Communications	Other Major Content	Minor & Specialized	Specialist Units	Educational Policy Studies
FIRST YEAR							
1	5						
2	4	1					
3		2	1	1			1
4		2	2	1			
5			2	2	1		
6		1	1	2			1
7		1	1	3			
8		1	1	2	1		
9			1	2	2		1
10			1	1	2		
11			1	1	2	1	
12			1		2	2	
13			1		2	2	
14			1		1	2	1
15			1		1	3	
16			1		1	3	
	9	8	16	15	15	13	4
SECOND YEAR							
17	1				1	2	1
18	1				2	2	
19	1				1	2	1
20	2				1	2	
21	2				1	1	1
22	3				1	1	
23	3				1	1	
24	4					1	

TABLE X (cont.)

Student Period	Basic Units: Input or Output Units	Basic Units: Ed. Psych.	Basic Units: Communications	Basic Units: Other Major Content	Basic Units: Minor & Specialized	Specialist Units	Educational Policy Studies
25	4					1	
26	4					1	
27	4					1	
28	4					1	
29	4					1	
30	4					1	
31	3					2	
32	2					3	
	46	—	—	—	8	23	3

that is quite likely that many students will choose to spend about 20 per cent of their time on this area throughout the first year, although there is nothing about the structure of WETEP that would prevent a student from taking this material on a more accelerated basis.

Seminar Schedules. Because of the seminar scheduling constraint cited earlier, it is assumed that students are effectively grouped by tens for work with specific learning units. Although much of the student's activity may be on an individual basis, there would, in general, be an average of at least nine other students working individually on the same material during the same two-week period; otherwise, no meaningful seminars could be conducted as part of the learning unit.

The extent of seminar activity for each student during a typical week may be determined as follows: From Table II, it can be seen that the student is expected to spend a total of 300 hours in Basic seminar activity during his participation in WETEP. For the elective portion of his program, he will spend an average of 334 x 530/1895 = 93.4 additional hours in seminars. Seminar activity must therefore be scheduled at an average rate of 393.4/64 = 6.15 hours per week. If a typical seminar period lasts one hour, this implies approximately 12 seminar sessions in each two-week period, or slightly more than two per learning unit. It is not realistic to assume that the total student population of 720 equivalent students is effectively organized into only 72 "unit-groups" or that only 72 of the available 321 learning units need to be "on line" at any one time, because each student may participate in five different groups during each two-week period. The more realistic assumption has therefore been made that there are 72 x 5 = 360 unit-group combinations during each two-week period, and that many of these unit-groups may be working on the same material.

Distribution of Unit Group Combinations. The very difficult task of trying to determine how many learning units will actually be in use at any one time, and how many students will need access to the instructional resources within each active unit must now be faced. At this point, it is no longer sufficient to deal with averages; some assumptions must be made about the probable distributions of load factors. Assuming that 240 of the 300 students in each regular class enter the WETEP program at the beginning of the fall term, and that the remaining 60 enter at the mid-year point.* We shall further assume that the 60 "equivalent students" representing the In-Service load enter and leave on a less regular basis, and that their learning unit requirements are quite uniformly distributed across all three categories of Basic, Specialist, and In-Service materials. The more detailed assumptions needed to develop a statistical picture of probable WETEP operations are presented in Tables XI through XIV.

Table XI is essentially an expanded version of the upper half of Table X, taking into account the size of the regular fall-enrollment class and the number of choices realistically available to the student at each of his decision points. The various pairs of numbers shown in this table all represent unit-group combinations; that is, 3•24 represents three learning units in use by 24 groups of ten students each. The total number of unit-group combinations for each two-week period (i.e., the sum of each horizontal row of products in the table) is 120. In the case of the Input or Output Units (actually consisting of Screening and Orientation activities in this case) and Educational Psychology, it is assumed that all entering students use this material on essentially the same schedule, not because this is a ridid requirement, but because it makes good sense. In the case of Communications, it has been assumed that the class follows a uniform schedule for the first eight periods, but then splits into four parallel streams, each

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*Because of these mid-year entrants to the program, it is helpful here to distinguish between "student" periods and "calendar" periods. A student period numbered 1 indicates the first two-week period of that particular student's participation in WETEP. The calendar periods are entered A through P, with period A being the first two weeks of an academic year. A student beginning his work in WETEP in September thus begins in period A, while a mid-year entrant to the program begins his period 1 work in calendar period I. Understanding this difference facilitates the reading of Tables XI through XVII.

TABLE XI

TYPICAL DISTRIBUTION OF UNIT-GROUP COMBINATIONS IN FIRST-YEAR WETEP PROGRAM REGULAR CLASS OF 240 STUDENTS

Period		Basic Units					Specialist Units	Educational Policy Studies
Stud	Cal	Input or Output Units	Ed. Psych.	Communications	Other Major Content	Minor & Specialized		
1	A	5·24						
2	B	4·24	1·24					
3	C		2·24	1·24	3·8			1·24
4	D		2·24	2·24	3·8			
5	E			2·24	6·8	D1		
6	F		1·24	1·24	6·8			1·24
7	G		1·24	1·24	9·8			
8	H		1·24	1·24	6·8	D1		
9	I			4·6	6·8	D2		
10	J			4·6	3·8	D2		1·24
11	K			4·6	3·8	D2	D3	
12	L			4·6		D2	D4	
13	M			4·6		D2	D4	
14	N			4·6		D1	D4	1·24
15	O			4·6		D1	D5	
16	P			4·6		D1	D5	

D1 = (1·4 + 2·3 + 4·2 + 6·1) = 24 (13 out of a possible 23 units)

D2 = (1·6 + 1·5 + 2·4 + 3·3 + 5·2 + 10·1) = 48 (22 out of a possible 23 units)

D3 = (1·3 + 4·2 + 13·1) = 24 (18 out of a possible 42 units)

D4 = (1·5 + 1·4 + 3·3 + 7·2 + 16·1) = 48 (28 out of a possible 42 units)

D5 = (1·6 + 1·5 + 2·4 + 5·3 + 10·2 + 18·1) = 72 (37 out of a possible 42 units) of which is equally popular. In the case of Other Major Content areas it is assumed that the students are equally likely to choose any of the three subjects (science, mathematics, and social studies), and that most students will choose to initiate their basic work on a second subject in the fifth period when time becomes available; in the seventh period, work on all three of the other major content areas is assumed to overlap.

The special distributions shown at the bottom of Table XI are assumed to apply to the Minor & Specialized Basic units and the Specialist units. Distribution D1, by way of example, is the assumed result when 24 different groups of students are given freedom to select from among 23 possible learning units, keeping in mind that many of these units are in "ordered pairs" that should be taken in a definite sequence. It is assumed that one unit is sufficiently popular as to be selected by four groups, two units are selected by three groups apiece, four additional units are selected by two groups apiece, and six units are used by only one group apiece. By the ninth period, when more groups become involved in these Minor and Specialized topics, the assumed distribution is altered as shown by D2, and nearly all of the available units are in actual service. There is a good probability, however, that at least one unit is not in actual use during any given period. Under the assumed guidelines presented in Table IX, approximately 42 of 132 Specialist units are realistically available to first-year students, and the assumed distributions which result when various numbers of groups are given opportunities to choose from among these topics are presented as D3, D4, and D5.

As noted in Table IX, the Educational Policy Studies material is taken concurrently with, but outside of, the WETEP context, so this activity has no direct bearing on the planning of WETEP facilities except as it represents slight reductions in the over-all student load. The entries under Educational Policy Studies in Tables XI through XIV thus serve only to account for suitable blocks of student time.

Table XII is similar to Table XI except that it covers the assumed unit-group distributions for the second-year program of each regular class and is thus an expanded version of the lower half of Table X. Tables XIII and XIV show the assumed distributions for the first-year and second-year programs, respectively, of the smaller mid-year classes. The distribution patterns are generally similar to those of Tables XI and XII, but the numbers of groups involved are smaller because of the smaller assumed enrollment in mid-year classes.

The summarized data actually needed for facilities-planning purposes are shown in Tables XV, XVI, and XVII, which were developed by combining the data shown in the four preceding tables. The load created by the In-Service student is assumed to be constant and quite independent of the activities of the regular classes, as indicated by the notes accompanying Tables XV, XVI, and XVII.

TABLE XII

TYPICAL DISTRIBUTION OF UNIT-GROUP COMBINATIONS IN SECOND-YEAR WETEP PROGRAM REGULAR CLASS OF 240 STUDENTS

Period		Basic Units						
Stud	Cal	Input or Output Units	Ed. Psych.	Communi-cations	Other Major Content	Minor & Special-ized	Special-ist Units	Educa-tional Policy Studies
17	A	1·24				D1	D6	1·24
18	B	1·24				D2	D6	
19	C	1·24				D1	D6	1·24
20	D	1·24 + 2·12				D1	D6	
21	E	4·12				D1	D7	1·24
22	F	4·18				D1	D7	
23	G	4·18				D1	D7	
24	H	4·24					D7	
25	I	4·24					D7	
26	J	4·24					D7	
27	K	4·24					D7	
28	L	4·24					D7	
29	M	4·24					D7	
30	N	4·24					D7	
31	O	4·18					D6	
32	P	4·12					D8	

$D1 = (1\cdot4 + 2\cdot3 + 4\cdot2 + 6\cdot1) = 24$ (13 out of a possible 23 units)

$D2 = (1\cdot6 + 1\cdot5 + 2\cdot4 + 3\cdot3 + 5\cdot2 + 10\cdot1) = 48$ (22 out of a possible 23 units)

$D6 = (1\cdot4 + 3\cdot3 + 4\cdot2 + 27\cdot1) = 48$ (35 out of a possible 132 units)

$D7 = (1\cdot3 + 3\cdot2 + 15\cdot1) = 24$ (19 out of a possible 132 units)

$D8 = (1\cdot5 + 1\cdot4 + 3\cdot3 + 6\cdot2 + 36\cdot1) = 72$ (47 out of a possible 132 units)

TABLE XIII

TYPICAL DISTRIBUTION OF UNIT-GROUP COMBINATIONS IN FIRST-YEAR WETEP PROGRAM MID-YEAR CLASS OF 60 STUDENTS

		Basic Units						
Period		Input or Output Units	Ed. Psych.	Communications	Other Major Content	Minor & Specialized	Specialist Units	Educational Policy Studies
Stud	Cal							
1	I	5·6						
2	J	4·6	1·6					
3	K		2·6	1·6	3·2			1·6
4	L		2·6	2·6	3·2			
5	M			2·6	6·2	6·1		
6	N		1·6	1·6	6·2			1·6
7	O		1·6	1·6	9·2			
8	P		1·6	1·6	6·2	6·1		
9	A			2·2+2·1	6·2	2·2+8·1		
10	B			2·2+2·1	3·2	2·2+8·1		1·6
11	C			2·2+2·1	3·2	2·2+8·1	6·1	
12	D			2·2+2·1		2·2+8·1	1·2+10·1	
13	E			2·2+2·1		2·2+8·1	1·2+10·1	
14	F			2·2+2·1		6·1	1·2+10·1	1·6
15	G			2·2+2·1		6·1	D9	
16	H			2·2+2·1		6·1	D9	

D9 = (1·3 + 2·2 + 11·1) = 18 (14 out of a possible 42 units)

TABLE XIV

TYPICAL DISTRIBUTION OF UNIT-GROUP COMBINATIONS IN SECOND-YEAR WETEP PROGRAM MID-YEAR CLASS OF 60 STUDENTS

Period		Basic Units				Minor & Specialized	Specialist Units	Educational Policy Studies
		Input or Output Units	Ed. Psych.	Communications	Other Major Content			
Stud	Cal							
17	I	1·6				6·1	1·2+10·1	1·6
18	J	1·6				2·2+8·1	1·2+10·1	
19	K	1·6				6·1	1·2+10·1	1·6
20	L	1·6+2·3				6·1	1·2+10·1	
21	M	4·3				6·1	6·1	1·6
22	N	2·5+2·4				6·1	6·1	
23	O	2·5+2·4				6·1	6·1	
24	P	4·6					6·1	
25	A	4·6					6·1	
26	B	4·6					6·1	
27	C	4·6					6·1	
28	D	4·6					6·1	
29	E	4·6					6·1	
30	F	4·6					6·1	
31	G	2·5+2·4					1·2+10·1	
32	H	4·3					2·2+14·1	

TABLE XV

SUMMARY OF PROBABLE REQUESTS FOR BASIC "LEARNING UNITS" DURING A TYPICAL OPERATING YEAR

Calendar Period	No. of Unit Groups	Probable Unit-Group Distribution	No. of Learning Units in Active Service
A	246	6·24 + 4·6 + 1·4 + 3·3 + 19·2 + 27·1	60
B	260	6·24 + 5·6 + 1·5 + 2·4 + 4·3 + 15·2 + 31·1	64
C	212	4·24 + 3·8 + 4·6 + 1·4 + 3·3 + 14·2 + 27·1	56
D	206	4·24 + 2·12 + 3·8 + 4·6 + 1·3 + 7·2 + 21·1	42
E	254	2·24 + 4·12 + 6·8 + 4·6 + 2·4 + 5·3 + 15·2 + 33·1	71
F	248	2·24 + 4·18 + 6·8 + 4·6 + 1·4 + 3·3 + 9·2 + 25·1	54
G	266	2·24 + 4·18 + 9·8 + 2·5 + 3·4 + 3·3 + 9·2 + 25·1	57
H	260	6·24 + 6·8 + 1·4 + 7·3 + 9·2 + 25·1	54
I	278	4·24 + 6·8 + 11·6 + 1·5 + 2·4 + 4·3 + 8·2 + 27·1	63
J	260	4·24 + 3·8 + 11·6 + 1·5 + 2·4 + 4·3 + 10·2 + 29·1	64
K	242	4·24 + 3·8 + 9·6 + 1·5 + 2·4 + 4·3 + 11·2 + 21·1	55
L	230	4·24 + 10·6 + 1·5 + 2·4 + 6·3 + 11·2 + 21·1	55
M	236	4·24 + 7·6 + 1·5 + 2·4 + 8·3 + 14·2 + 33·1	69
N	212	4·24 + 6·6 + 2·5 + 3·4 + 3·3 + 13·2 + 23·1	54
O	194	4·18 + 6·6 + 2·5 + 3·4 + 3·3 + 16·2 + 23·1	57
P	170	4·12 + 10·6 + 1·4 + 3·3 + 13·2 + 23·1	54

NOTE 1: The number of Basic learning units potentially available is 117.

NOTE 2: The demand for Basic materials by In-Service students is assumed to be constant at 20 unit-groups, and is included in this table with the assumed distribution of 1·3 + 3·2 + 11·1.

TABLE XVI

SUMMARY OF PROBABLE REQUESTS FOR SPECIALIST "LEARNING UNITS" DURING A TYPICAL OPERATING YEAR

Calendar Period	No. of Unit Groups	Probable Unit-Group Distribution	No. of Learning Units in Active Service
A	74	1·4 + 4·3 + 5·2 + 48·1	58
B	74	1·4 + 4·3 + 5·2 + 48·1	58
C	80	1·4 + 4·3 + 5·2 + 54·1	64
D	86	1·4 + 4·3 + 6·2 + 58·1	69
E	62	2·3 + 5·2 + 46·1	53
F	62	2·3 + 5·2 + 46·1	53
G	74	3·3 + 7·2 + 51·1	61
H	80	3·3 + 8·2 + 55·1	66
I	56	2·3 + 5·2 + 40·1	47
J	56	2·3 + 5·2 + 40·1	47
K	80	3·3 + 9·2 + 53·1	65
L	104	1·5 + 1·4 + 5·3 + 12·2 + 56·1	75
M	98	1·5 + 1·4 + 5·3 + 11·2 + 52·1	70
N	98	1·5 + 1·4 + 5·3 + 11·2 + 52·1	70
O	146	1·6 + 1·5 + 3·4 + 9·3 + 15·2 + 66·1	95
P	170	1·6 + 2·5 + 4·4 + 10·3 + 17·2 + 74·1	108

NOTE 1: The number of Specialist learning units potentially available is 132.

NOTE 2: The demand for Specialist materials by In-Service students is assumed to be constant at 20 unit-groups, and is included in this table with the assumed distribution of 1·3 ÷ 1·2 + 15·1.

TABLE XVII

OVERALL SUMMARY OF PROBABLE REQUESTS FOR WETEP RESOURCES
(All categories combined)

Calendar Period	Probable Unit-Group Distribution	No of. Active "Learning Units"
A	6·24 + 4·6 + 2·4 + 8·3 + 28·2 + 84·1	132
B	6·24 + 5·6 + 1·5 + 3·4 + 9·3 + 24·2 + 88·1	136
C	4·24 + 3·8 + 4·6 + 2·4 + 8·3 + 23·2 + 90·1	134
D	4·24 + 2·12 + 3·8 + 4·6 + 1·4 + 6·3 + 17·2 + 88·1	125
E	2·24 + 4·12 + 6·8 + 4·6 + 2·4 + 8·3 + 24·2 + 88·1	138
F	2·24 + 4·18 + 6·8 + 4·6 + 1·4 + 6·3 + 18·2 + 80·1	121
G	2·24 + 4·18 + 9·8 + 2·5 + 3·4 + 7·3 + 20·2 + 85·1	132
H	6·24 + 6·8 + 1·4 + 11·3 + 21·2 + 89·1	134
I	4·24 + 6·8 + 11·6 + 1·5 + 2·4 + 7·3 + 17·2 + 76·1	124
J	4·24 + 3·8 + 11·6 + 1·5 + 2·4 + 7·3 + 19·2 + 78·1	125
K	4·24 + 3·8 + 9·6 + 1·5 + 2·4 + 8·3 + 24·2 + 83·1	134
L	4·24 + 10·6 + 2·5 + 3·4 + 12·3 + 27·2 + 86·1	147
M	4·24 + 7·6 + 2·5 + 3·4 + 14·3 + 29·2 + 94·1	153
N	4·24 + 6·6 + 3·5 + 4·4 + 9·3 + 28·2 + 84·1	138
O	4·18 + 7·6 + 3·5 + 6·4 + 13·3 + 35·2 + 98·1	166
P	4·12 + 11·6 + 2·5 + 5·4 + 14·3 + 34·2 + 106·1	176

NOTE 1: Total number of learning units potentially available is 314.
NOTE 2: The number of In-Service learning units potentially available is 65.
NOTE 3: Demand for In-Service materials is assumed to be constant at 20 unit-groups per period, and is included in this table with an assumed distribution of 1·3 + 4·2 + 9·1.

Probable Access Requirements for Learning Units. Keeping in mind that all tables in this section of the report are heavily based on assumptions, a few tentative conclusions can be drawn from Table XVII:

1. Since the number of active learning units ranges from 121 to 176 (with an average value of 138), and since there are 314 hypothetical learning units in the entire WETEP curriculum, arrangements should be made to provide rapid access to about 40 per cent of the curriculum at any one time.

2. About 63 per cent of the learning units in active service, on the average, are used by only one group of ten students.

3. There is a fairly high probability that at least small numbers of units may be used by as many as 240 students (24 groups) during a two-week period.

The practical significance of the use-distribution data developed in Tables IX through XVII is shown by Table XVIII, which shows the relationship between the number of groups using any particular learning unit and the corresponding access rate, for the number of requests per Class A hour, for each item of material within the unit. Specific items of material within the active learning units will probably be requested at rates ranging from about once every four hours (during Class A time) to approximately six per hour. It may be that the access rates associated with large numbers of groups (i.e., 12, 18 or 24) will be closer to the average values shown in Table XVIII than to the peak values, because the various groups will probably have staggered starting times for each learning unit.

Additional schedule factors that must be taken into account in the attempts to plan optimum facilities for WETEP are summarized in Table XIX. Data for the column labeled Total Demands per Two-Week Period were determined by multiplying the number of items per "learning unit" by 3600, which is the total number of student-unit combinations to be accounted for in each two-week period (ten times the number of unit-group combinations). The "effective" request rate per hour is then determined by dividing by 124.6, which is the number of effective hours in each two-week period. One of the most significant entries in Table XIX is the indication that actual requests for audio-visual materials may be expected at an average rate of about 223 per hour during Class A time. This represents a significant load that must be handled either by manual operators, by an automated system, or by some combination of the two. The indicated rate of 62 requests per hour for CAI lessons is an important parameter that must be considered in planning the CAI system. The 53.5 requests per hour for programmed instruction materials may have similar significance if and when it

TABLE XVIII

ACCESS RATES PER CLASS A HOUR FOR MATERIALS WITHIN "LEARNING UNITS" USED BY VARIOUS NUMBERS OF GROUPS DURING A 2-WEEK PERIOD

(124.6 Effective Hours)

No. of Groups	No. of Students	Average Requests per Class A Hour	Probable Peak Rate*
1	10	0.08	0.24
2	20	0.16	0.48
3	30	0.24	0.72
4	40	0.32	0.96
5	50	0.40	1.20
6	60	0.48	1.44
8	80	0.64	1.92
12	120	0.96	2.88
18	180	1.44	4.32
24	240	1.92	5.76

*Because there are optimum sequences of learning experiences within most units, most of the demand for each item will probably occur during about one-third of the two-week period.

TABLE XIX

SCHEDULE FACTORS FOR VARIOUS TYPES OF INDIVIDUAL-STUDENT ACTIVITY
(Assuming Uniform Distribution of Activities Throughout 314 Learning Units)

Activity	Total Program Hours (all categories)	No. of Items (Table III)	Average Time per Item (Minutes)	No. of Items per Learning Unit	Total Demand per Two-Wk Period	Request Rate per Effective Hour
Video Tapes	217	740	17.6	2.36	8,480	68.0
Films	142	973	8.8	3.10	11,150	89.5
Slide Sets	76	439	10.4	1.40	5,040	40.4
Audio Tapes	69	132	31.3	0.42	1,512	12.1
Slide/Tape Sets	80	140	34.3	0.45	1,605	12.9
Sub-Totals A-V Materials	581	2424	14.4	7.73	27,787	222.9
Prog. Inst.	151	580	15.6	1.85	6,660	53.5
C.A.I.	91	674	8.1	2.15	7,740	62.1
Reading	578	1668	20.8	5.31	19,116	153.0

proves practical to use electronic facilities for this type of interactive instruction. The request rates for reading assignments and independent study probably have very limited significance for facilities-planning purposes, because it is likely that many of these reading and study assignments will be derived from a limited number of books, many of which will be readily available to or perhaps already in the possession of the student. Future experience will probably show, however, that the request rates for reading and study assignments are directly related to the load on book-type library facilities.

Storage of Sound Motion Pictures

Introduction. Although most of the recognized media for audio-visual materials will be employed in WETEP, video tape and film have been selected for particularly detailed analysis because these media are to be used very intensively and will have a major bearing on the audio-visual facilities requirements and the related costs. For purposes of this analysis, we shall combine the instructional modes identified in Tables II and III as Video Tapes and Films under the more general heading sound motion pictures.

Program materials stored on either of the two media can be readily transferred to the other (although the process of making color film recordings from color video tapes is far from perfected at this time), and it is both possible and desirable to use the two media in various combinations in order to take maximum advantage of the favorable properties of each. Consideration should also be given to possible use of newer media for the replication of sound motion pictures, such as the CBS "EVR" (Electronic Video Recording) system or the recently announced RCA system based on holographic recording.

Number of Sound Motion Pictures Required. Table XX shows the combined numbers of events (or programs) based on sound motion pictures in various time ranges, using data derived from the video tape and film entries in Table III. The data shown under Assumed Average Time will be needed for certain computations at later stages in this report. The events have been subdivided into Basic, Specialist, and In-Service categories in proportion to the relative numbers of program hours allotted to film and tape viewing in these categories in Table II. (This subdivision is based on the assumption that the "mix" of long and short programs is essentially the same in all categories.)

If the assumptions behind Table XX are valid, these data reveal immediately that the WETEP Instructional Materials Center must store a total of at least 1713 sound motion pictures for individual student use. Of these, 737 will be used by an average of 320 students per year, 598 will be used by an average of 104 students per year, and 378 will be used by an average of 20 students per year. The anticipated pattern of utilization is very different from that of audio-visual materials used to support conventional teaching in classrooms

TABLE XX

NUMBERS OF SOUND MOTION PICTURE "LESSONS" IN VARIOUS TIME RANGES AND PROGRAM CATEGORIES

Time Range (Min.)	Assumed Average Time	Total No. of Items	Basic	Specialist	In-Service
0-5	4	580	245	203	132
6-10	8	257	123	90	44
11-15	13	135	57	47	31
16-20	18	188	85	66	37
21-40	30	492	201	171	120
41-60	50	58	24	20	14
61-90	75	3	2	1	-
TOTALS		1713	737	598	378

or lecture halls. In a large lecture hall, a motion picture could easily be shown to 320 students simultaneously with only a single use of the film or video tape; in the WETEP program, it may well be necessary to pass the film or tape through a machine 320 times to give each student the opportunity to see it when it best fits his personal schedule and progress plan. It is quite possible, in fact, that many films or tapes for WETEP will be used to the point where they actually wear out in a physical sense.

For preliminary planning purposes, it may be assumed that individual films or tapes can be used an average of 150 times before they must be retired because of excessive scratches, drop-outs, or other quality defects resulting from a combination of wear and handling abuse. If the program content remains useful for an average period of about five years, about ten copies or "prints" will be required of each program in the Basic category, four copies will be required of each program in the Specialist category, and one copy should be sufficient for each program in the In-Service category.

Cost Analysis of Storage Alternatives. Basic costs for ten different variations of four basic media that might be used for storing sound motion pictures are presented in Table XXI. To keep the table simple, we shall assume that a master copy of each program already exists in the form of a video tape or a film negative, and that all "prints" or duplicate copies are ordered in quantities of ten. The prices shown for basic playback units are approximately those charged for single units (Prices vary somewhat, of course, among different manufacturers and different distributors.) Data sources and other significant assumptions are identified in the notes for Table XXI.

Notes for Table XXI

1. Film costs were derived from the price schedules of typical film laboratories. Monochrome film prints are priced at about 3.7¢ per foot plus the costs of reels and storage containers. (In standard 16-mm systems, the film runs at 36 feet per minute.)

2. Color film costs were figured at 8¢ per foot plus the costs of reels and storage containers.

3. The typical quantity-ten cost of Super 8 color film prints with magnetic sound stripes is 11.5¢ per foot, plus the costs of reels and cans. (For 24 frame-per-second sound movies, Super 8 film runs at 20 feet per minute.) The maximum playing time for Super 8 projectors is usually no more than 20 or 30 minutes; longer programs would require the use of multiple reels.

4. Jayark cartridges were used for this analysis because they permit playing times of up to 30 minutes. The cost factors for Fairchild cartridges are very similar (perhaps $1.00 less for the shorter cartridges), but the playing time for Fairchild cartridges is limited to about 20 minutes. The basic price of Fairchild playback units is about $520. The film itself is priced at 11.5¢ per foot, as explained in Note 3.

5. The typical quantity-ten cost of Super 8 color film prints with optical sound tracks is 9¢ per foot. Technicolor cartridges for such film are priced at $4.50 for playing times of ten minutes or less, $5.95 for playing times up to 30 minutes.

6. Of the many scanning formats now in use of 1-inch video tape recording, those offered by Ampex and the International Video Corporation (IVC) were selected for this analysis because they "bracket" the range of tape speeds in common use. Ampex machines operate at 9.6 inches per second, while IVC machines operate at 6.91 inches per second; most other machines operate at speeds somewhere between these limits.

TABLE XXI

COSTS OF SOUND MOTION PICTURES ON VARIOUS MEDIA

(Assuming that duplicate "prints" are purchased in quantities of 10)

Medium	Approximate Price of Basic Playback Unit (not including TV monitors required for Category B)	Program Running Time in Minutes					
	Price	4	8	13	18	30	50
A. APPROACHES YIELDING OPTICAL IMAGES							
1. 16-mm film, monochrome (See Note 1)	$ 500	$ 5.61	$11.28	$19.27	$26.13	$42.36	$ 70.95
2. 16-mm film, color (See Note 2)	500	11.81	23.67	39.39	53.99	88.80	148.35
3. Super 8 color film, magnetic sound, standard reels (Note 3)	350	9.40	19.20	31.00	42.50	73.00	- -
4. Super 8 color film, mag. sound, Jayark cartridges (Note 4)	400	17.75	26.95	38.45	49.95	77.55	- -
5. Super 8 color film, optical sound, Technicolor cartridges (Note 5)	300	11.70	18.90	29.35	38.35	59.95	- -
B. APPROACHES YIELDING TV SIGNALS							
6. 1" Video tape, color, Ampex format (Note 6)	$3800	12.75	16.23	22.35	25.70	36.14	53.54
7. 1" Video tape, color, IVC format (Note 7)	4700	11.65	14.25	18.05	21.30	29.10	42.10

TABLE XXI (cont.)

	Approximate Price of Basic Playback Unit (not including TV monitors required for Category B)						
		Program Running Time in Minutes					
Medium	Price	4	8	13	18	30	50
8. 1" Video tape, color, IVC format, short programs combined on 1-hour reels (Note 8)	$4700	$ 5.00	$ 8.13	$12.05	$15.97	$25.10	$ 42.10
9. CBS EVR System, monochrome (Note 9)	800	12.70	23.90	37.90	51.90	85.50	141.50
10. RCA Holographic recording (Note 10)							

For purposes of this analysis, it is assumed that video tape "raw stock" is purchased on one-hour reels in quantities of 50 or more, and that extra reels are purchased for shorter program lengths. (Because of limited market demand or the major inventory-control problems involved, most tape manufacturers do not offer 1-inch video tape on short-playing-time reels, at least not at attractive prices.) Under these conditions, the cost of tape for Ampex machines turns out to be equivalent to 77¢ per running minute plus $8.00 for each reel and storage box. Because of the requirement for tape "leaders" long enough to bring the tape to a stop following fast rewind operations without unthreading the machine, actual running times of 5, 9, 15, 20, 32 and 52 minutes were assumed for program lengths of 4, 8, 13, 18, 30, and 50 minutes. To provide a fair comparison with photographic media where laboratory costs are involved, the costs of making video tape duplicates have been taken into account in lines 6, 7, and 8 in Table XXI; these costs are estimated to be 10¢ per program minute plus 50¢ per item.

The Ampex Corporation offers a wide range of video tape recorders using the same 1-inch tape format, priced from about $1150 to $10,000. The indicated price of $3800 should provide a color-capable machine suitable for use in a dial-access system.

7. Because of the lower tape speed, the cost of "raw stock" for the IVC format is 55¢ per running minute instead of 77¢; all other costs are the same as for the Ampex format. The $4700 price applies to a color-capable machine suitable for remote control.

8. Because the reel used for the storage of a video tape program represents a major fraction of the cost, substantial savings are possible, particularly for very short programs, when a number of programs are combined on one-hour reels. The same shared-reel concept also makes it possible to increase the number of programs that can be placed "on line" (i.e., made accessible through electronic control facilities) from a given number of machines. For purposes of this analysis, the amount of tape stock for the shorter programs was increased slightly to provide two-minute "guard bands" between program segments, and the numbers of programs per reel were assumed to be 10, 6, 4, 3, 2, and 1 average playing times of 4, 8, 13, 18, 30, and 50 minutes.

It should be noted that the use of shared reels for short tapes increases the probability that student requests for program materials may interfere with each other (when requested materials are stored on reels already in use), but the analysis of probable activity patterns presented elsewhere in this report suggests that the probability of such interferences remains low enough to be of little practical concern.

9. Authoritative price data from CBS for small quantities of cartridges for their Electronic Video Recording (EVR) system were not available at the time of this analysis, so the data presented here consist of projections from an EVR price schedule dated April 1, 1969. The published price schedule shows monochrome cartridge prices for programs of various lengths from five minutes to 50 minutes and in various quantities from 150 to 2,000. A thorough analysis of this price schedule (including projections of the data to zero program length and to zero quantities) indicates that the cartridge itself has an apparent price of $1.50, the EVR monochrome film stock is priced at about 40¢ per program minute, and the set-up cost for producing a master negative or the equivalent is about $24 per program minute. These were the factors used in computing the costs shown in Line 9 of Table XXI.

10. On September 30, 1969, RCA announced and demonstrated at its research laboratories a new system for the storage and duplication of sound motion pictures in color or monochrome. This new system employs laser-generated holograms embossed on a plastic tape rather than conventional optical images; playback devices convert these holograms to television signals for display on conventional television receivers. Except for a general indication that holographic tapes will cost less than $10 for half-hour programs in consumer-market quantities, no price data is available for this analysis. It may be assumed, however, that the overall cost picture for this RCA system is roughly comparable to that of the EVR system. In both cases, these new media are designed for large-quantity applications, where the cost of producing a relatively expensive master can be distributed across many "prints". Because the print quantities required for WETEP are quite small, these new "video replication" techniques are not likely to find immediate application in this project. This situation could change, however, if either commercial or non-profit publishers find it advantageous to use EVR or holographic tape cartridges for the widespread distribution of audio-visual programs suitable for incorporation in the WETEP curriculum.

In addition to the cost data presented in Table XXI, other factors that must be considered when selecting media for storing sound motion pictures include: (a) storage space requirements, (b) logistical problems involved in distributing program materials to the point of use, (c) probable waiting times, (d) ease of operation, especially for the students, (e) maintenance problems, and (f) problems of acoustic noise in playback equipment.

To simplify the remaining portion of this analysis, primary emphasis shall be placed on the media described in Lines 5, 7, and 8 in Table XXI--Super 8 film with optical sound tracks in Technicolor cartridges, and 1-inch video tape employing the IVC format with either separate reels for each program or shared reels. Other possibilities are not ruled out, but it is appropriate to select the two most promising media for further detailed study.

Some of the significant differences between Super 8 film cartridges and video tape recordings may be highlighted with a few comments. The film cartridges involve substantially lower playback equipment cost but significantly higher per-program costs, especially for the longer programs. Because no cartridge-loaded video tape players are yet available in the economic range suitable for WETEP, the cartridge film units are clearly superior in terms of ease of operation. On the other hand, video tape recorders in the $4700 price class are suitable for remote-control operation, so it is possible to devise arrangements whereby students or faculty members do not have to bother with loading or threading operations at all. The fact that the film cartridges are of endless-loop type and therefore require no rewinding is nominally an advantage, but this advantage is partially offset by the fact that an endless-loop cartridge cannot be operated in the reverse direction and cannot be advanced rapidly to a desired program section. Problems of acoustic noise, glare, and heat at the point of use are significantly greater with cartridge film equipment than with video tape equipment. Operating costs for the two approaches are probably about the same--the cost of projection bulbs for the film projectors is roughly comparable to the cost of video heads for the magnetic tape recorders.

Assuming that the life of either cartridge film or video tape equipment is about ten years, and that the life of content material in the WETEP curriculum averages about five years, the total cost of using sound motion pictures is 42 student positions over a ten-year span is somewhat less for magnetic tape (in the IVC format) than for Technicolor film cartridges, as indicated by Table XXII. Data for the column labeled Number of Items were obtained by additional processing of the data in Table XX; the numbers of Basic items were multiplied by ten and the numbers of Specialist items were multiplied by four to take into account the anticipated numbers of copies that would be needed during the assumed five-year life span of the subject material. In the case of 1-inch magnetic tape, data are shown for both separate reels and shared reels because it is difficult to predict how far it will be practical to go with the shared-reel approach; it is quite likely, however, that the cost would be somewhere between these two limits. The capital cost for video tape machines could be lowered substantially if the physical arrangement of equipment is such that remote control is not necessary; IVC machines suitable for direct manual operation are available at approximately one-half of the $4700 price used for this analysis.

With respect to storage space, each Technicolor film cartridge requires approximately 1.4 inches of shelf space and each reel of 1-inch video tape requires about 1.8 inches. A single set of all 1713 sound-motion-picture programs needed for WETEP would require 200 feet of shelf space if stored in Technicolor cartridges, 257 feet if stored on separate IVC video tape reels, and 77.6 feet if stored on 508 one-hour video tape reels. It is probably more realistic, however, to hink in terms of the numbers of cartridges or reels that should be kept on hand at any one time.

TABLE XXII

TOTAL COSTS FOR SOUND MOTION PICTURES OVER A 10-YEAR SPAN

Average Time (Minutes)	No. of Items for 5 yrs.	Total Cost of Technicolor Film Cartridges	Total Cost of 1" Video Tapes, Separate Reels	Total Cost of 1" Video Tapes, Shared Reels
4	3394	$ 39,710	$ 39,540	$ 16,970
8	1634	30,883	23,285	13,284
13	789	23,157	14,241	9,507
18	1151	44,141	24,516	18,381
30	2814	168,699	81,887	70,631
50	334	32,832*	14,061	14,061
75	24	3,798**	1,613	1,613
Total Reproduction Cost of Program Material for 5 Years		$343,220	$199,143	$144,447
Total for 10 Years		$686,440	$398,286	$288,894
Machines for 42 Student Positions		$ 12,600	$197,400	$197,400
TOTAL COSTS		$699,040	$595,686	$486,294

* Requires two cartridges per item

** Requires three cartridges per item

In the case of Technicolor film cartridges, it would be desirable to estimate in advance the number of cartridges that would be needed of each topic during the useful life of the program contents and to order that quantity immediately. This strategy not only gives the advantage of the "price break" associated with the maximum justifiable quantity at the time of purchase, but also provides duplicate cartridges on the shelves to reduce the average student waiting time. In other words, if it can be predicted that at least ten copies of a film will eventually be needed (for reasons related to physical wear-out), it makes sense to have the ten copies on hand from the very beginning, and to use a simple type of inventory-control system (such as an arrangement for placing a check mark on the storage box each time the cartridge is used) to equalize the wear among the copies. This makes it possible for as many as ten individual students to use the program simultaneously but under individual control. If only one or two cartridges are kept in service at a time and are replaced only when they wear out, the probability is much higher that students will have to wait for other students to finish using the films. A complete set of 10,140 Technicolor cartridges (the total for the column entitled No. of Items for 5 Years in Table XXII) would require 1182 shelf feet for storage.

In the case of video tape materials, it is possible to play the game by slightly different rules, since additional copies of programs can be made very easily and as rapidly as they are needed. In addition to the master copy of each program on 16-mm film or broadcast-quality video tape (which should be kept in a safe place regardless of the medium selected for actual use), it would probably be desirable to keep on hand two duplicate tapes of each program in the Basic and Specialist categories and a single duplicate of each program in the In-Service category. (The computer-based inventory management system should provide ample indication when the demand for any program is likely to build up to the point where additional temporary copies should be provided to avoid excessive waiting times.) If video tape programs are stored on separate reels, a total of 3048 reels would be required to store the recommended number of duplicates, and the shelf space required would be 458 feet. If shared reels are employed, the recommended numbers of duplicates could be stored on as few as 1172 reels, and the shelf space requirement could be reduced to 176 feet.

Summary. There are so many unproved assumptions involved in the foregoing analysis that it would be unwise to draw firm and binding conclusions from it, but it appears that both Super 8 film in Technicolor cartridges and 1-inch video tape provide reasonable approaches to the storage of sound motion picture materials for WETEP.

Some of the other alternatives listed in Table XXI also merit serious consideration. Although Super 8 film with magnetic sound tracks costs a little more than the same film with optical sound tracks, there are some audio-visual specialists who feel that the magnetic approach offers enough higher quality to justify the added cost. Likewise, the alternative types of Super 8 projectors that cost a little more may have compensating advantages in terms of ruggedness and reliability. (From data in Tables IV and VII, one can determine that the equipment at each student position must operate for an average of 61,180/42 = 1460 hours per year, so durable equipment is needed.) Both equipment costs and program running costs may vary somewhat among the various brands of 1-inch video tape machines, but such matters as picture quality, stability, ease of threading, ease of servicing, space and power requirements, and even appearance should be considered along with the cost factors in making a final equipment selection.

Providing Student Access to Audio-Visual Materials

Introduction. Through previous analyses in this report, it has been determined that 42 student positions in the WETEP facilities should be provided for the use of sound motion pictures, and 28 additional positions are needed for the use of still pictures and audio materials (see Table VII). Basic cost factors associated with various approaches to the storage of sound motion pictures have also been discussed. As the next step in this analysis of WETEP facility requirements, it is appropriate to consider several alternative means that might be selected to give individual students access to audio-visual materials.

Non-Automated Access Systems. If it were necessary to activate the WETEP program with a bare-minimum capital investment, one could design a system in which appropriate numbers of audio-visual instruments were independently mounted in "stand-alone" study carrels, and the actual audio-visual materials are placed directly in the hands of students. Typical capital costs for this approach would be approximately as follows:

70 Study Carrels (furniture portion) @ $100	$ 7,000
42 Cartridge Film Projectors @ $300	12,600
20 Slide Projectors @ $150	3,000
18 Tape Cassette Players @ $100	1,800
10 Tape-Slide Synchronizers @ $100	1,000
Total	$25,400

Although the capital investments for this approach are quite modest, the use of simple, stand-alone carrels may not prove most economical in the long run. It has been noted, for example, that the substantially higher cost of video tape players as compared to cartridge film projectors can be more than off-set by savings in the cost of video tape stock as opposed to film stock over a ten-year period. One should also take into account the relatively high probability of greater losses or damage to audio-visual materials when the actual materials must be handled by students. There are also such factors as waiting time, set-up time, and ease of operation that are somewhat difficult to translate directly into cost factors, but which have a definite bearing on the overall effectiveness of the program.

An alternative approach that is well worth considering is one in which the student receives all audio-visual material through a small color-television receiver equipped with headphones for the audio material. This approach not only relieves the student of any need to handle the actual audio-visual materials, but also makes each position more versatile--it need not be restricted to a single type of audio-visual material. Capital costs for this approach can be kept to a minimum by placing all materials on a request basis, and using manual operators, probably student workers, to retrieve the requested materials from shelf storage and to load them on suitable machines. Typical capital costs for this approach would be approximately as follows:

70 Study Carrels (furniture portion) @ $100	$ 7,000
70 Color TV Monitors @ $400	28,000
Cables & Patch Panels (for assigning machines to specific student positions)	5,000
42 Video Tape Machines @ $4700	197,400
20 Color TV Slide Chains @ $7500	150,000
18 Audio Tape Decks @ $500	9,000
Total	$396,400

From Table XIX, it can be seen that the anticipated demand rate for audio-visual materials will be about 223 requests per effective hour. If we assume that an operator can respond to about 20 requests per hour, we can predict a need for 11 operators during Class A periods, and smaller numbers (in proportion to the assumed popularity ratings shown in Table V) during Class B, C, and D periods. This would allow three minutes for the operator to receive each request message (probably via teletype, so that a written log is maintained), to acknowledge the request, to retrieve material from a shelf, to load a transport, to delegate control of the transport to the appropriate student position, and to return the previously-used item to shelf storage. Waiting time for the student after each request would probably be on the order of two to three minutes. If these operators are students paid at the rate of $2.00 per hour, each "effective" hour operator position represents an academic-year expense of $2.00 x 62.5 x 32 = $4000 (student pay rate times the number of effective hours per week times the number of weeks per year); the 11 operator positions required for a manually-operated system involve an annaul cost of $44,000.

Full-Access Automated System. Both the operator expense and the student waiting time could be reduced to insignificant levels by placing all audio-visual materials "on line" so that they can be accessed with puch-button convenience through electronic communication channels. Capital costs for this approach are prohibitive at this time, however, as can be seen by the following brief summary:

1713 Video Tape Machines @ $4700	$ 8,051,000
579 TV Slide Chains @ $7500	4,340,000
272 Audio Tape Decks @ $500	136,000
70 Carrels with Color TV Monitors	35,000
70 x 2424 Dial-Controlled Audio-Video Switching System (optimistic estimate)	8,500,000
Total	$21,062,000

Since the equivalent number of students on campus at any one time is 720, a capital investment of $21.1 million comes to about $29,300 per student--very expensive facilities to achieve minor gains in the convenience associated with the use of audio-visual materials. Of course, the required investment could be reduced substantially by introducing a few compromises. For example, the 1713 sound motion pictures could be stored on only 508 reels, requiring only 508 video tape machines and reducing the cost of machines from $8.05 million to $2.39 million. The penalty involved in this compromise would be an average waiting time of approximately 45 seconds while the system automatically searches for the desired program on the reel of tape. Further savings could be obtained by scaling down the system so that it provides "on-line" storage for only about 40 per cent of the curriculum at any one time, corresponding to the learning units known to be active. By this means, the capital investment might be reduced to perhaps $7.5 million, but this is still almost 20 times greater than the capital cost for a manually-operated system.

Controlled-Access Systems with Partial Automation. Although complete automation of the audio-visual system may be unreasonably expensive, there are two alternative approaches that should lead to reductions in both waiting time and operator expense: (a) extensive use of cartridge-loaded machines to reduce the time required to service each request, and (b) partial automation involving the use of automatic, pre-loaded machines for those items expected to be in high demand.

In exploring the first of these alternatives, it is assumed that audio tape materials are stored in cartridge or cassette form, that sets of slides are stored in Kodak "Carousel" trays or equivalent rapid-loading magazines, and that all sound motion pictures of less than ten minutes duration (whether produced originally on video tape or film) are available on Technicolor cartridges. It is assumed that the cartridge-loaded projectors used to play back these films are couples to color television cameras. Under these circumstances, assuming an efficient physical arrangement of the storage shelves relative to the audio-visual machines, it seems reasonable to expect an operator to service 40 requests per hour, allowing 1½ minutes for message receipt, acknowledgement, cartridge retrieval, loading, machine assignment, and re-shelving of the previous material. If, for economic reasons, all sound motion pictures of greater than ten minutes duration continue to be stored on video tape, the original three-minute time allowance will still be needed for these longer motion pictures.

Table III shows that the project WETEP curriculum involves 837 sound motion pictures of ten minutes or shorter duration, 876 sound motion pictures of greater than ten minutes duration. The average numbers of short and long motion pictures per learning unit are 2.67 and 2.79, respectively, and the anticipated numbers of requests per effective hour are 77.1 and 80.6, respectively. If the shorter motion pictures are grouped in the same "fast loading" category as audio and still-picture materials, the combined request rate for "fast loading" materials is 77.1 + 65.4 = 142.5 requests per effective hour. The operator requirements can thus be determined as follows:

For "fast loading" materials: 142.5/40 = 3.56
For "slow loading" materials: 80.6/20 = 4.03
Total 7.59≈8

Assuming an average duration of six minutes for the short films, they account for (837 x 6)/60 = 83.7 hours of the total time allocation of 359 hours shown in Table II for sound motion pictures. Of the 42 student positions required to handle sound motion pictures, it follows that 42 x(83.7/359) = 9.8 or approximately ten positions should be in use at any given time for the "short" films, leaving 42 - 10 = 32 positions available for the longer motion pictures. To allow for minor variations around this average pattern, it is assumed that the 42 student positions are to be served by 12 cartridge film TV chains and 34 video tape recorders. Typical capital costs for this approach to a manually-operated system would be approximately as follows:

70 Carrels with Color TV Monitors	$ 35,000
Cables & Patch Panels	5,000
12 Color TV Cartridge Film Chains @ $7500	90,000
34 Video Tape Machines @ $4700	159,800
20 Color TV Slide Chains @ $7500	150,000
18 Cartridge Audio Tape Decks @ $500	9,000
Total	$448,800
Net increase relative to system using VTR's for all sound motion pictures	$ 52,400

This analysis suggests that the use of cartridge film for short motion pictures would cost about the same as the use of video tape for all motion pictures (the slightly higher capital costs and film cartridge costs are largely off-set by the potential savings of about $12,000 per year in operator expense), but that the waiting time for the shorter items could be brought down to about one minute. It should also be noted, however, that the use of cartridge film equipment precludes the possibility of rapid fast forward and rewind operations to enable students to sample or repeat brief sections of films with great convenience.

An exploration of the alternative of partial automation begins with the assumption that an instructional-materials management system has been devised which enables the WETEP staff to determine, on a week-by-week basis, which learning units are likely to be in highest demand for the immediate future. The audio-visual materials related to these most active units can then be loaded on automatically-controlled machines, leaving a smaller number of operator-controlled machines for the less intensively used materials.

As an aid in selecting appropriate numbers of machines to be placed in automatic service, Table XXIII shows the relationship between assumed numbers of most active learning units and the corresponding fraction of the total load (of 360 unit-groups) represented by such units. This table was developed from the data in Table XVII. The summarized data at the bottom of the table suggest that an average of 50 per cent of the total load could be handled without operator intervention if arrangements were made for placing the materials associated with the 18 most active units on automatic machines, at a cost far less than that involved in placing all 314 learning units on automatic machines. Further study of Table XX indicates, however, that the law of diminishing returns becomes operative for relatively small numbers of most active learning units; increasing the number of automated learning units from 12 to 18 requires a 50 per cent increase in the number of machines but yields only a 7/43 = 16 per cent increase in the fraction of the total load handled. It seems most reasonable, therefore, to explore the practical significance of placing on automatic machines the audio-visual materials associated with the 12 most active learning units. While the average fraction of the load which can be handled by this means is 43 per cent, the range shown in Table XXIII extends from 96/360 = 27 per cent to 192/360 = 53 per cent.

To determine the numbers of machines required to put the 12 most active learning units "on line", the average number of items per "learning unit" in each category is multiplied by 12, yielding the following results, rounded off to next-highest whole numbers.

Sound Motion Pictures (Video Tape Machines): 5.46 x 12 = 66
Still Pictures (Color TV Slide Chains): (1.40 + 0.45) x 12 = 22
Audio Cartridge Tape Decks: (0.42 + 0.45) x 12 = 11

TABLE XXIII

NUMBERS OF UNIT-GROUPS OF WETEP ACTIVITY ACCOUNTED FOR BY DIFFERENT NUMBERS OF MOST-ACTIVE "LEARNING UNITS"

	Number of Most-Active "Learning Units"							
Period	6	8	10	12	14	16	18	20
A	144	156	168	174	180	186	192	198
B	144	156	168	179	187	194	200	206
C	112	126	138	148	155	161	167	173
D	120	136	150	162	172	178	184	190
E	96	112	128	144	156	168	176	182
F	120	136	152	168	180	192	199	205
G	120	136	152	168	184	197	206	214
H	144	160	176	192	199	205	211	217
I	112	128	144	156	168	180	192	204
J	112	126	138	150	162	174	186	195
K	112	126	138	150	162	174	183	190
L	108	120	132	144	156	166	174	181
M	108	120	132	143	152	160	166	172
N	108	120	132	142	151	159	166	172
O	84	96	108	119	129	137	145	153
P	60	72	84	96	108	119	128	136
Average	113	127	140	152	163	172	180	187
% of Total Load	31%	35%	39%	42%	45%	48%	50%	52%

The numbers of machines required for the remaining demand load (100 - 43 = 57 per cent of the original totals), assuming continued use of cartridge-loaded film projectors for motion pictures of less than ten minutes, are as follows, again rounded off to next-highest whole numbers.

Video Tape Machines: 34 x 0.57 = 20
Color TV Cartridge Film Chains: 12 x 0.57 = 7
Color TV Slide Chains: 20 x 0.57 = 12
Audio Cartridge Tape Decks: 18 x 0.57 = 11

Typical capital costs for such a partially-automated system would be as follows:

86 Video Tape Machines @ $4700	$404,200
7 Color TV Cartridge Film Chains @ $7500	52,500
34 Color TV Slide Chains @ $7500	255,000
22 Audio Cartridge Tape Decks @ $500	11,000
70 Carrels with Color TV Monitors	35,000
70 x 149 Dial-Controlled Audio-Video Switching System (rough estimate)	750,000
Total	$1,507,700

The operator requirement for this partially-automated system during effective hours would be 7.59* x 0.57 = 4.3. Over a ten-year span, the savings in operator expense relative to a completely-manual system would be approximately $268,000. Roughly half of the material requested by students would be available with push-button convenience, and most of the other items would be available with waiting periods of only about one minute. Even the longer, less frequently used motion pictures should be available with waiting times not in excess of three minutes.

A capital investment of $1.507 million for WETEP audio-visual facilities corresponds to about $2090 per student, assuming a total population of 720 equivalent students. This is roughly comparable to the investment in conventional classroom facilities (academic buildings typically cost about $45,000 per classroom, or $1500 per student position), but does not, of course, include the costs of the architectural shell needed to house the students and the equipment. If the anticipated service life of the equipment is about ten years, and each student spends two years in WETEP, amortization of the partially-automated audio-visual system described above would account for approximately $418 of the total cost of educating each student.

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*7.59 = operators required per effective hour when shorter motion pictures are grouped in the same "fast loading" category as audio and still picture materials (see derivation on page 352.

The "Universal Terminal" Concept

Introduction. A strong interest has been expressed in integrating the audio-visual, CAI, data-gathering, and data-processing systems for WETEP to such an extent that "universal terminals" can be used for access to audio-visual materials, tutorial materials, and alpha-numeric records of various kinds, by students (alone or in seminar groups), faculty members, and staff members. It has not been possible to explore all aspects of such an integrated system to the same extent that the audio-visual system has been examined, but a brief analysis suggests that this "universal terminal" concept is basically sound, and opens a number of avenues for the further development of WETEP.

Terminal Requirements. As presently visualized, the "universal terminal" might consist of the following components:

	Approximate Cost
Color TV Monitor (small size for individual use, larger size for group use)	$400
Keyboard (with encoder for ASCII code)	250
Audio Headset	35
Dial and Source-Control Panel	175
Furniture Components	100
Total Cost	$960

With suitable facilities in the central system, the television screens could be used for the display of either visual materials or computer-generated displays. In a few applications where computer-generated documents may be needed in "hard copy" form, the basic terminal could be supplemented by a teletypewriter or a low-speed printer. The system's central computer would also have high-speed input/output equipment, including a high-speed printer, for "batch processing" jobs. Each terminal would be connected to the central system through three lines: a coaxial cable for video, an audio pair for program audio, and a multi-conductor cable for data and control signals.

The numbers of terminals required to implement various aspects of the WETEP program are summarized below (* designates requirements which have not been studied in detail; the numbers listed have been derived from initial planning documents):

Individual Use (from previous analysis of audio-visual requirements)	
Sound Motion Pictures	42
Still Pictures	28
Interactive Instruction	29
Sub-Total, Individual Use	99

Group Instruction and Remote Use	
Seminar Rooms	17
Laboratory Areas	13*
Large-Group Instruction Room	1
Ten Cooperating Schools	10*
Remote Vans	3*
Sub-Total, Group and Remote Use	44
Faculty and Staff Use	
Faculty Offices or Conference Spaces	30
Program Administration	10*
Media Production and Control	4
Research and Assessment	10*
Sub-Total, Faculty and Staff Use	54
Grand Total	197

Central System Requirements and Cost Estimates. The central system to which these "universal terminals" are connected would consist of two major elements: (a) a time-sharing computer system (such as the RCA Spectra 70/46 or the equivalent), and (b) a remote-access, audio-visual retrieval system. An important interface between these two elements would be a set of digital-to-video converters (one needed for each active computer input-output channel), which have the ability to convert coded data signals into television displays, employing the same scanning standards as broadcast television. (Equipment for this purpose is manufactured by several different companies, including RCA, A. B. Dick Company, and Computer Communications, Inc.) Some of the switching operations needed to couple a specific terminal either to a desired audio-visual source or to a computer input-output channel could be controlled from the terminal through a telephone-type dial or similar selection device; other switching operations might be controlled automatically by the computer in response to messages entered via the terminal keyboards. A detailed systems analysis would be required to determine the optimum switching arrangements.

Computer requirements for WETEP are considered in a later section of this report, but the basic requirements for the audio-visual, switching, and computer interface components needed to implement a central system capable of serving all 197 "universal terminals" in an integrated system are considered here.

The numbers of audio-visual lesson sources and computer input-output channels required to support the various types of WETEP activity are summarized as follows:

Type of Use	Video Tape Machines	TV Film Chains	TV Slide Chains	Audio Tape Decks	Computer I/O Channels
Individual Use	86	7	34	22	24
Group or Remote Use	7	1	2	1	14
Faculty and Staff Use	3	1	1	1	10
Totals	96	9	37	24	48

The numbers of machines shown in this table for individual use are consistent with those required for the partially automated audio-visual system discussed earlier in this report. One advantage of an integrated system employing the "universal terminal" concept is that there can be more than 70 places for students to go to receive audio-visual materials, and it is not necessary to make permanent assignments of machines to either automatic or operator-controlled service. The "mix" can be changed readily as requirements change. Eleven of the 24 computer channels suggested for individual use would be required to support computer-aided-instruction activity. The remaining 13 should be sufficient to handle A-V directory service, A-V service requests, and fairly intensive data-gathering and scoring operations in connection with programmed instruction.

Machine allocations for group or remote use are based on the assumption that terminals in these group-use areas will actually be "on line" only about 25 per cent of the time in Class A hours. These terminals would actually have access to all the materials stored in the automatic A-V machines, but it is appropriate to add small numbers of operator-controlled machines to handle the additional request loads represented by these terminals. It is assumed that computer channels will be needed for A-V directory service, A-V request messages, access to certain computer-stored files that may be needed for seminar discussions, and calculator-mode operations in the laboratory areas.

Additional small numbers of audio-visual machines are added to the system to handle the service requests from faculty and staff positions; it is assumed that faculty and staff members will have frequent needs to request programs for previewing purposes, for critical evaluation, or for future planning purposes. Faculty and staff members will also need access to the computer for student records, schedules, and a variety of administrative functions.

Keeping in mind that at least 12 of the audio tape sources would normally be coupled to a corresponding number of television slide chains, the total number of A-V lesson sources indicated by the above chart is 154. It would be desirable to provide at least six additional audio-visual channels in the system for introduction of off-the-air broadcase signals or signals from observational TV cameras, bringing the total number of audio-visual sources to 160. Addition of the video signals associated with the 48 input/output channels for the computer yields a grand total of 208 signal sources to be handled through the central system's switching facilities for possible connection to any of the 197 terminals. (See Table XXIV.)

A single 197 x 208 switching matrix to handle video, audio, and data signals simultaneously would be very large, very expensive, and quite possibly beyond today's "state of the art". A few rough calculations suggest that such a switching matrix would occupy at least 25 standard equipment racks and would cost in excess of $1.6 million, exclusive of the dial-control facilities. It is possible, however, to sub-divide the switching matrix into more practical sections, as indicated by the master systems drawing shown in Figure 1.

A "pre-selection" switching matrix associated with each group of terminals is used to connect the terminals in active use with either the audio-visual system or the computer system, probably in response to control information introduced through the dial panel at the terminal. In the case of the audio-visual system, further selection takes place in an audio-visual selection matrix under dial control, operator control, or computer control. A rough indication of complexity and cost in switching systems is provided by the number of cross-points or points where a switch contact might be closed. A single 197 x 208 matrix would require 40,976 cross-points; the four smaller matrices shown in Figure 1 accomplish the same function with a grand total of 28,290 cross-points. Further study of the problem might lead to approaches which provide still greater savings through further practical sub-division of the switching matrices.

Explanatory Notes for Table XXIV.

1. Although predictions of the future involve some uncertainty, it is quite likely that costs of audio-visual equipment suitable for use in the WETEP system will be reduced quite significantly within the next five years, conceivably to the vicinity of $1,000 per audio-visual lesson source even for color. In the past five years, costs for this type of equipment have been reduced from the $30,000-$50,000 level to the present $4,000-$10,000 level.

2. The estimates provided here for switching equipment are less firm than those for the other equipment categories, because there are virtually no precedents for video switching systems of the scale required here (audio and data switching systems of the sizes needed here are no problem). These estimates are based on a rather arbitrary $75 per cross-point. A thorough systems engineering study of the WETEP switching problem is recommended before specifications are prepared.

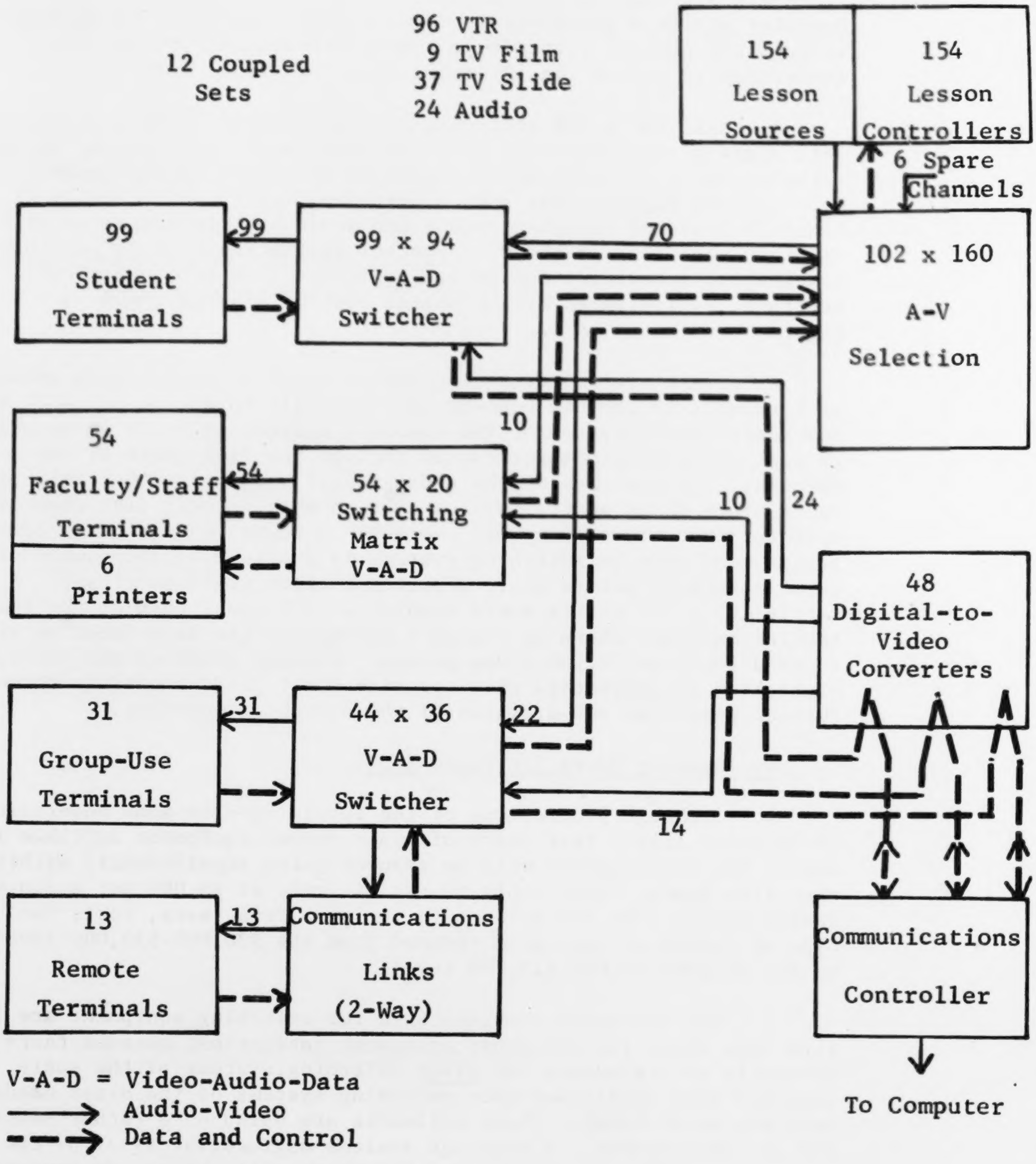
12 Coupled Sets
96 VTR
9 TV Film
37 TV Slide
24 Audio
154 Lesson Sources
154 Lesson Controllers
6 Spare Channels
99 Student Terminals
99
99 x 94 V-A-D Switcher
70
102 x 160 A-V Selection
10
54 Faculty/Staff Terminals
6 Printers
54
54 x 20 Switching Matrix V-A-D
10
24
48 Digital-to-Video Converters
31 Group-Use Terminals
31
44 x 36 V-A-D Switcher
22
14
13 Remote Terminals
13
Communications Links (2-Way)
Communications Controller
To Computer
V-A-D = Video-Audio-Data
Audio-Video
Data and Control

FIGURE 1

WETEP MASTER SYSTEM

TABLE XXIV

ESTIMATED EQUIPMENT COSTS FOR NON-COMPUTER PORTION
OF INTEGRATED SYSTEM SHOWN IN FIGURE 1

Terminal Equipment	
197 "Universal terminals" @ $960	$189,120
6 Non-Impact Printers @ $6000	36,000
Sub-Total, Terminal Equipment	$225,120
Computer Interface Equipment	
48 Digital-to-Video Converters (Display Control Units) @ $6500	$312,000
Audio-Visual Lesson-Source: Equipment (See Note 1)	
96 Video Tape Machines @ $4700	$451,200
9 Color TV Film Chains @ $7500	67,500
37 Color TV Slide Chains @ $7500	277,500
24 Audio Cartridge Tape Decks @ $500	12,000
Sub-Total, A-V Equipment	$808,200
Switching Equipment (See Note 2)	
102 x 160 Audio-Video Switching System	$1,224,000
99 x 94 Video-Audio-Data Switching System	698,000
44 x 36 Video-Audio-Data Switching System	119,000
54 x 20 Video-Audio-Data Switching System	81,000
Sub-Total, Switching Equipment	$2,122,000
Communications Equipment (See Note 3)	
13 Two-Way Microwave Links (for video signals, multiplexed channels for audio and data signals) @ $38,000	$494,000
Grand Total	$3,961,320

3. The estimate provided here is based on the assumption that the remote terminals in the ten cooperating schools and the mobile vans will be interconnected to the central WETEP facility through two-way, privately-owned microwave facilities, and that transmission paths will remain in the "line of sight" region (within about 30 miles). This equipment would require licenses from the FCC, and there is some question as to whether the required number of microwave channels could be assigned to WETEP. Alternative approaches might include use of 2500 ITFS equipment, for limited-reception-broadcast of outgoing signals, or the use of transmission channels leased when needed from common carriers.

Analysis of Information System Requirements

Introduction. As noted in the preceding section on the "universal terminal" concept, convenient access to computer facilities will be required by WETEP students, faculty members, and administrative personnel. This section of the report is devoted to a discussion of the applications for computer technology in WETEP. These applications are so numerous and diverse that it is more appropriate to think in terms of a total information system, rather than a conventional computer system. It is quite possible that more than one central processor will be required to meet the information-handling needs, and it is also possible that effective alternatives to conventional computers can be used for some functions.

Major Information-Handling Tasks for WETEP. Because of the evolutionary nature of WETEP, it is impossible to predict accurately the demands that will be placed on the programs information system, but preliminary estimates of data-processing requirements can be based on studies of anticipated needs. The major needs known at this time are summarized below. These needs will be studied intensively and translated into system requirements during the first year of program development.

(1) Interactive Instruction and Testing. As noted in Section II of this report (Table IV), a need is anticipated for about 15,800 student-hours per year of computer-assisted instruction, and it is also expected that much of the testing needed for the assessment program will be conducted with the aid of computers. Table II indicates that enough CAI curriculum material to support 91 hours of instruction will eventually be required, although it should be necessary to have only about 10 per cent of this material "on line" at any one time. In the previous discussion of the "universal terminal" concept, it was determined that approximately 24 computer terminals (or the equivalent) will be required to support the anticipated CAI activity, computer-aided testing, and the data-gathering aspects of programmed instruction.

(2) Student Counseling. It is anticipated that several types of computer-controlled files and related processing routines will be necessary to support the student counseling and program planning

functions. Counseling professors should have convenient access to complete student files, probably in two categories: (a) historical data, and (b) current activity data. The historical file for each student would probably contain biographical data, high school performance data, and the permanent record of completed activities at the University of Wisconsin. The current activity file would identify those modules in which the student is presently engaged, would show his performance scores for the material completed within the past few weeks (perhaps with a brief summary of his accumulative performance scores), and would forecast his program for perhaps two weeks into the future. Provision should be made for each student to gain access to his own current activity file, but not that of any other student. A "housekeeping" program will be needed for the weekly review of student activity programs and the transfer of appropriate summarized data to each student's permanent file record.

(3) Student Program Planning. As an aid in program planning, both students and faculty members will need access to a master planning program that would identify the various alternatives open to each student at any given time. This master planning program is visualized as a dynamic file, updated at least daily to reflect current changes in module availability, seminar scheduling, and other significant factors. Probably the most effective way to gain access to the master planning program would be through a dialogue routine that permits a student or faculty member to "zero in" on a desired subject area by a simple series of questions and answers. It is anticipated that each student will need to access this master planning program for perhaps three minutes every other day.

(4) Student Assessment. Closely related to the functions of student counseling and program planning is the problem of monitoring student progress and performance. In developing this portion of the information system, careful consideration must be given to psychological factors as well as technological and economic factors. It is desirable to gather enough information about each student's activity to enable him and his counselor to monitor his progress effectively, but the student should not be made to feel that he is being observed so closely that his freedom is effectively abridged. From a technical point of view, it could be possible to incorporate in the WETEP information system a data-gathering facility capable of keeping complete records of the resources actually used by each student. For example, a simple "sign on, sign off" procedure could be developed to permit identification of the student each time he makes use of one of the universal terminals, and all requests for learning resources could be handled through the information system so that automatic records can be generated for these requests. (While it may be undesirable for psychological reasons to couple such records of service requests with the names of students, the records themselves can be very important to those responsible for managing the media resources and maintaining the

audio-visual machines.) It will certainly be desired to accumulate records of the results of formal testing experiences. It is anticipated that the "data messages" related to student activities will simply be accumulated in a computer tape station or the equivalent as they occur, and then batch processed at the end of each operating day to reduce the data to appropriate summaries which can be used to up-date the student files and the media-use files.

(5) Audic-Visual Directory and Service Requests. As each student seeks to implement his individualized program, he will have frequent need (perhaps three or four times per day) to consult a directory that can advise him as to how to gain access to the specific learning resources called for by his program. It is quite possible that this directory will be changed on a daily basis (as different resource materials are placed "on line" in response to anticipated demands), so it will probably be more practical to make this directory available through the universal terminals rather than in "hard copy" form. The directory would show how each item in the Instructional Materials Center can be obtained--i.e., by dialing a specific number, by requesting operator assistance, or by requesting a tape or film cartridge at a service window. It should also be possible to design the information system in such a way that all A-V service requests are simply entered through the keyboard of any universal terminal. The system could be programmed so that it automatically switches up to the appropriate terminal any A-V program that happens to be on-line, automatically delivers to an operator a service request for other remote-access items, or automatically sends back an appropriate message to the student if further action is required on his part.

(6) Scheduling of Instructional Resources. Another important function that must be handled by the information system is the scheduling of seminars, conferences, and "on-line" audio-visual materials. Because there are no precedents for the WETEP program, it is difficult to determine at this time to what extent these schedules can be established by the computer alone, and to what extent human judgment will be required. To a first approximation, the scheduling of seminars is roughly comparable to the reservations problems that have been successfully handled by computers for airlines and theater-ticket agencies. The scheduling of seminars and conferences can probably best be handled by direct interaction with "on line" files that show current "availabilities", and which can be updated immediately whenever a student commits himself to a specific seminar or conference (or cancels a previous resevation). The scheduling of "on line" audio-visual materials can probably be handled effectively through a daily updating of the A-V Directory File, using batch-processed data derived from the student programs and student activity records.

(7) Analysis of Research Data. There will undoubtedly be a need for processing large blocks of data for both curriculum research and overall assessment of the WETEP program. Much of this data processing can be done on a batch basis, but the information system should also have provision for calculator mode operation through the universal terminals to permit real time manipulation of research data by both students and faculty members.

(8) Administrative Housekeeping. The WETEP information system should provide the data-processing capability to handle a number of routine administrative tasks, such as: (a) budgeting and accounting, (b) purchasing, (c) supplies and inventory control, (d) accounts receivable and payable, (e) maintenance scheduling, and (f) media production scheduling. Many of the procedures and formats used for these "housekeeping" tasks must be compatible with those used elsewhere at the University of Wisconsin; it is possible, in fact, that some of these tasks may simply be delegated to other university facilities.

Summary of Information System Characteristics. In view of the wide range of tasks that must be handled by the WETEP information system, the general characteristics of the system itself can be summarized as follows. The system:

- must have the ability to handle both "batch" and time-sharing operations.

- should preferably be integrated with the media system in such a way that universal terminals can be employed for both computer access and access to audio-visual materials. In general, this implies compatibility between the system and conventional television transmission systems, achieved through suitable interface devices.

- must have the capacity for simultaneous operation; this is, the system must be able to accommodate or perform two or more operations on different types of data simultaneously. It would not be satisfactory to "dedicate" the entire system to specific types of operations for major periods.

- must have an interactive capability; that is, it must be able to accept information or data from an outside source, perform specified operations on such data, position the data in a specified location, and present the data to the user--all in real time. This capability permits a process of communication or dialogue to exist between the user of the system itself, or among various parts of the system.

- should be integrated to the extent that all information entering the system and processed by it will exhibit internal consistency, and that the techniques by which information is maintained and processed will minimize redundancy. Great importance is attached to this characteristic because many of the files stored in the system will be used for several different purposes.

- should permit output to be received in either TV display or "hard copy" form. The use of universal terminals places significant restraints on the formats that can be used for the presentation of information. A detailed systems analysis should be performed to determine how best to provide suitable formats for both "hard copy" output documents that remain compatible with the requirements for television display.

Costs and Personnel Requirements for a Candidate Information System

Selection of Candidate System. During the first year of WETEP development, the information-handling tasks identified in the preceding section of this report will be studied in detail and translated into specific system specifications in terms of memory requirements, degree of access required, processor time required, security requirements, and special programming requirements. Alternative approaches that will be given careful consideration during this first year of information-system development include:

- a fully-integrated, centralized system using a single processor that can handle both time-sharing and "batch" operations simultaneously.
- multiple-computer systems that may employ smaller processors to handle specific information-processing tasks. These separate processors would presumably function as sub-systems in a suitably integrated overall system.
- use of visual display systems (based more on television technology than on computer technology) to handle some of the functions. (For example, the audio-visual directory and the master planning program might well lend themselves to this type of storage and retrieval.)
- use of the University of Wisconsin Computer Center, commercial service bureaus, or commercial time-sharing services to handle some of the information-handling tasks.
- delegation of some or all of the computer-assisted instruction or computer-assisted testing functions to advanced types of "teaching machines", some of which may be designed to function as terminals for data-gathering systems.

- application of unconventional technological systems, such as video data files, holographic memories, or new combinations of microform, television, and digital devices.

To make possible an initial analysis of costs and personnel requirements, the first of these alternative approaches has been selected as a tentative "candidate solution" for the WETEP information-system problem. Data-processing equipment with the necessary characteristics to satisfy the system requirements as outlined in the previous section of this report is currently available from several manufacturers, and a discussion of the equipment configuration, personnel requirements, and annual costs for a typical system of this type will provide useful guidelines for future system development. It should be made very clear, however, that selection of a candidate system for this analysis does not preclude selection of other alternatives when the final system specifications are prepared.

Configuration of Candidate System. The candidate configuration selected for this report and illustrated in Figure 2 will require the following items of hardware:

1. Central processor - a computer appropriate for both batch processing and time-sharing. Multiprogramming will be a requirement due to the need for concurrent operation of a variety of applications and types of processing. The size of the memory must be expandable and/or the machine should be upward dompatible with larger computers to allow the WETEP prototype to be applied to larger programs.

2. Magnetic storage devices - both tape and random access devices. At least one tape station is to be compatible with those used in the University of Wisconsin Computation Center to facilitate exchange of data. It is estimated that 250 million to 300 million bytes (characters) of on-line random access storage will be required for full operation. Because the first few years of the project will not utilize this much, the storage capacity will be increased in a modular fashion as needed. Tentative identification of master files is presented in Table XXV.

3. Input/output devices - high speed printer, card reader, and card punch. The universal terminals to be used for general access to the computer are discussed in an earlier section of this report.

4. Communication interface - hardware allowing the central processor to communicate with remote terminal devices. The studies of terminal usage in WETEP indicate that 48 terminals (accessing the computer simultaneously) will be more than adequate.

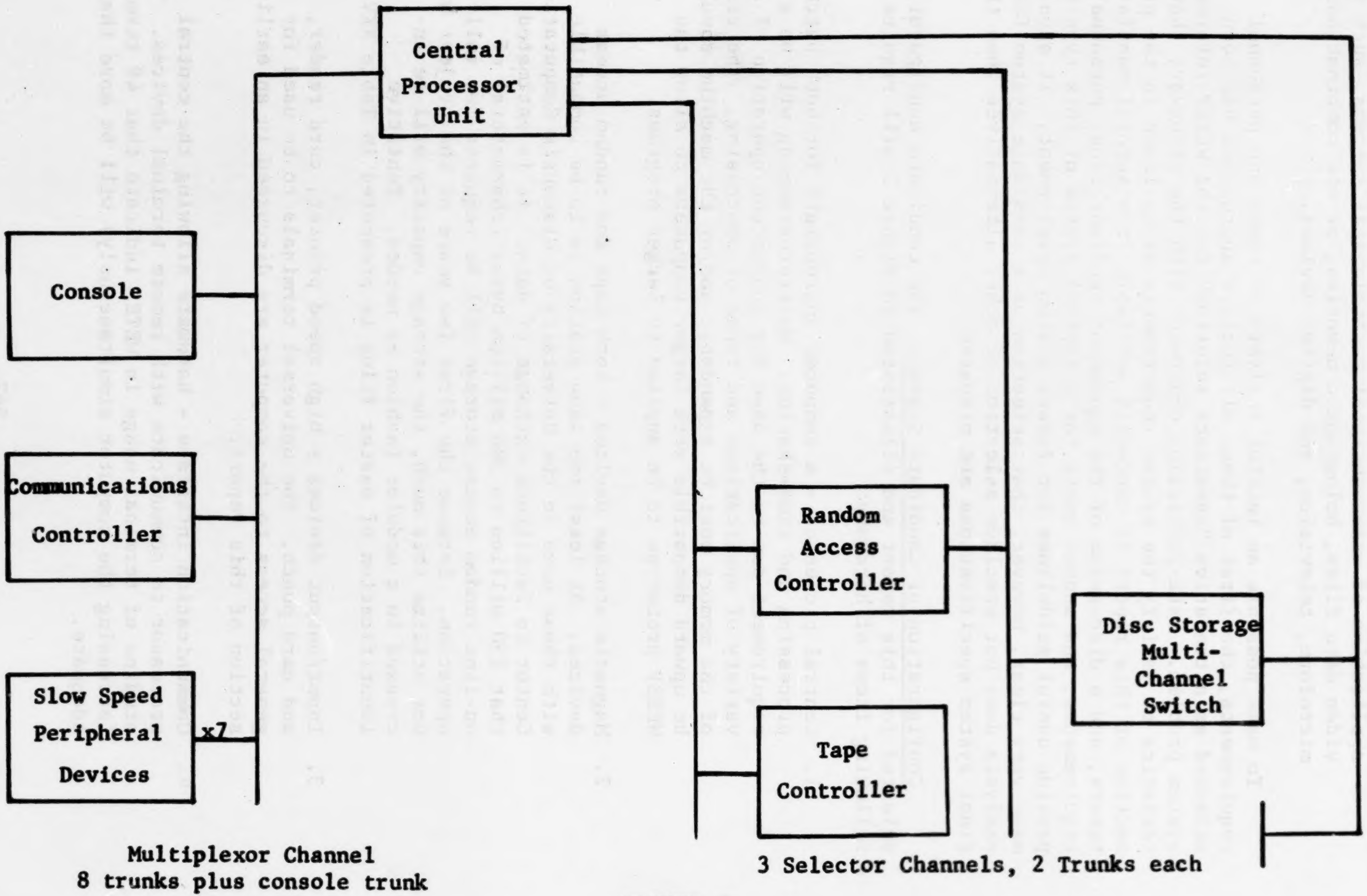
Central Processor Unit
Console
Communications Controller
Slow Speed Peripheral Devices
x7
Random Access Controller
Tape Controller
Disc Storage Multi-Channel Switch
Multiplexor Channel
8 trunks plus console trunk
3 Selector Channels, 2 Trunks each

FIGURE 2
CENTRAL SITE

TABLE XXV

WETEP MASTER FILES

File	Storage	No. of Discs *	On-Line
Permanent Student	Random Access	1	Yes
Temporary Student	Random Access	1	Yes
Inventory (instructional materials)	Random Access	3	No
Accounting	Random Access/ Tape	<1	No
CAI Curriculum	Random Access	1	Yes
History (student)	Tape		No
Faculty/Staff	Random Access	<1	No
Course File (identification for 256 modules)	Random Access	<1	Yes
Test Data Bank	Random Access	1 +	Yes
Research (undefined and varying formats)	Random Access		Yes

* This estimate of file size has purposely been generous to allow for file growth.

In addition to hardware, supplies such as disc packs, tapes, and various machine room supplies (including printer ribbons, paper, and card stock) must be considered. Although acquisition of 11-platter disc packs is accounted for during the developmental stages of the project, it is safe to assume that two or three additional packs will be needed each year of operation as volume of data grows. Because the life of a tape is considerably shorter than that of a disc, 25 2400-foot reels of 800 BPI nine-channel tape will be purchased each year to accommodate this data growth. Machine room supplies, too, must be replenished regularly, and a good rule-of-thumb cost estimate for these is the equivalent of one month's machine rental per year.

Personnel Requirements. To support the information system needs of WETEP, a wide array of data processing personnel will be necessary. All of the positions illustrated in Figure 3 and described in Table XXVI must be filled when the system is fully operational, however some may require several people while others are part-time in nature. Total costs for personnel are based upon a combination of the time-phase analysis and the figures shown later in this report.

Annual Operational Costs. The operational costs are those annual expenditures anticipated for WETEP following completion of the development phase. A projected annual cost for the first year of operation (1975-1976) is contained herein. Costs for subsequent years have not been projected although an annual increment of 6 per cent across-the-board for cost-of-living compensations can be utilized for planning purposes.

Sample Hardware Costs:

Hardware	Annual Rental	Annual Maintenance
Central Processor and Appropriate Features	$164,196	$21,501
Magnetic Storage Devices	82,020	19,695
Input/Output Devices	21,144	7,935
Communications Interface	26,772	5,208
Sub-Totals	$294,132	$54,339

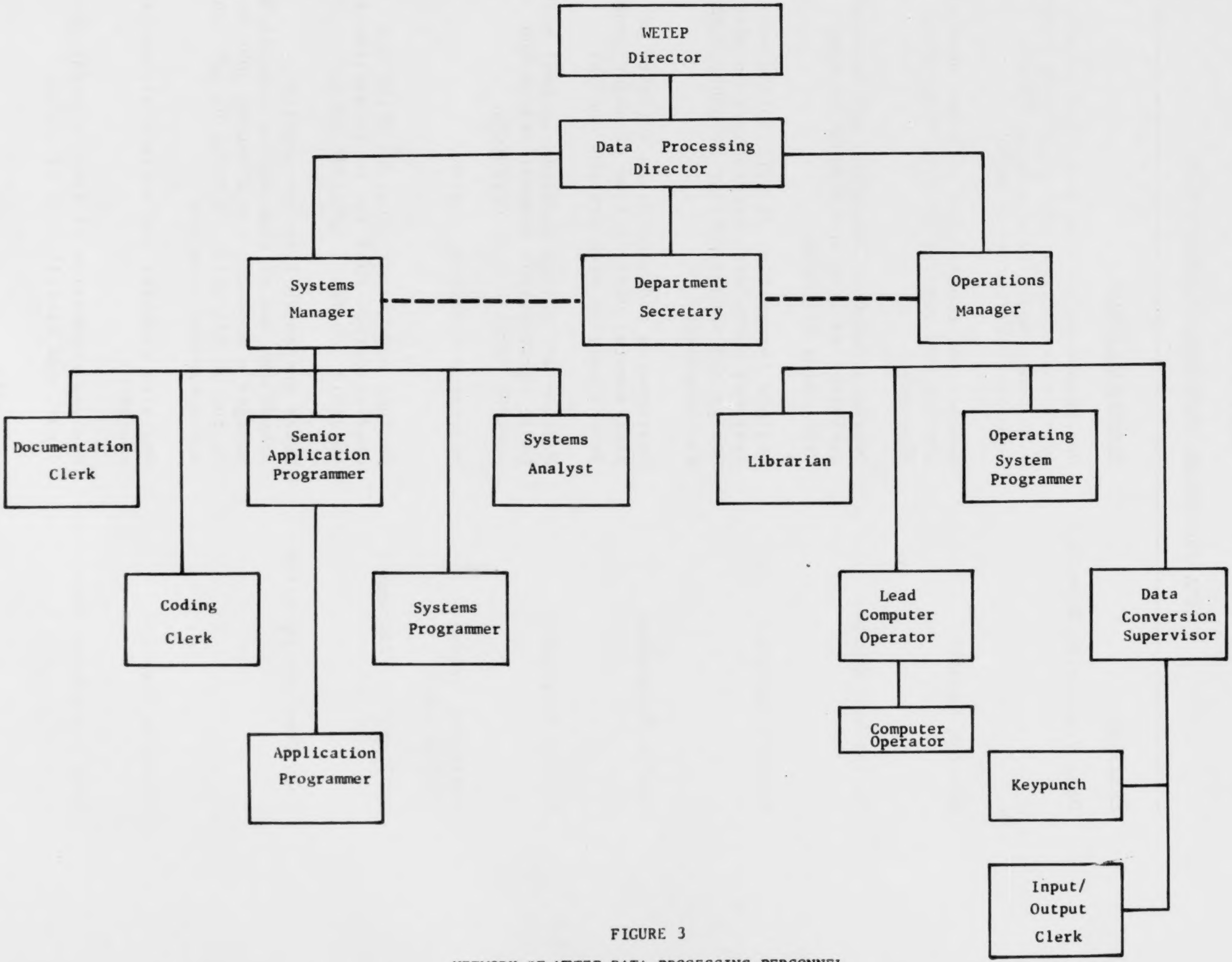
WETEP Director
Data Processing Director
Systems Manager
Department Secretary
Operations Manager
Documentation Clerk
Coding Clerk
Senior Application Programmer
Application Programmer
Systems Programmer
Systems Analyst
Librarian
Lead Computer Operator
Computer Operator
Operating System Programmer
Data Conversion Supervisor
Keypunch
Input/ Output Clerk

FIGURE 3

NETWORK OF WETEP DATA PROCESSING PERSONNEL

TABLE XXVI

DATA PROCESSING PERSONNEL RESPONSIBILITY

Position	Responsibilities
Data Processing Director	Determines policy for installation and oversees entire operation; acts as liaison with other major functions of WETEP; reports to Director of WETEP.
Systems Manager	Manages and coordinates software activity; advises and reports to Data Processing Director.
Operations Manager	Oversees computer operation and associated activity; advises and reports to Data Processing Director.
Systems Analyst	Designs integration of application subsystems; works with programmers on detail design and specifications of subsystems and programs.
Senior Programmer	Coordinates and supervises activity of programmers; designs flow of major programs in conjunction with systems analyst.
System Programmer	Designs and writes programs to deal with basic input-output communications and control functions of computer.
Operating System Programmer	Maintains operating system.
Application Programmer	Designs and writes programs which are user-oriented; that is, to accomplish a specific job for a specific user.
Lead Computer Operator	Takes responsibility for supplies, scheduling use of computer in operations manager's absence, coordinating jobs to be run on his shift, setting up job control, and operating computer.
Computer Operator	Operates computer and peripheral tabulating equipment.
Data Conversion Supervisor	Manages conversion of data, control of input, and distribution of output.

TABLE XXVI (continued)

Position	Responsibilities
Key Puncher	Operates keypunch or whatever device is used to prepare input for computer.
Input-Output Control Clerk	Logs input and output; bursts, decollates, and routes output.
Documentation Clerk	Produces final flow charts, narratives, and run sheets of systems and programs according to standards set by software and operations departments.
Librarian	Logs and controls circulation of tapes, discs, and card files.
Coding Clerk	Converts raw data to specified codes as accepted by computer programs.
Secretary	Performs general clerical and secretarial functions.

Annual Overhead Costs:

Item	Cost	Quantity	Total
Disc Packs	$550	3	$ 1,650.00
Magnetic Tape	20	25	500.00
Miscellaneous Supplies			24,000.00
			$26,150.00

Data Processing Staff:

(Salaries projected herein are estimates. Although specific or individual salaries will undoubtedly vary from these estimates, a general leveling factor can be expected to prevail.)

Title	Annual Salary	Quantity	Total
Director	$29,500	1	$ 29,500
Systems Manager	20,000	1	20,000
Operations Manager	17,700	1	17,700
Systems Analyst	16,600	2	33,200
Senior Programmer	17,700	1	17,700
System Programmer	16,600	2	33,200
Operating System Programmer	16,600	1	16,600
Application Programmer	14,200	3.5	49,700
Lead Computer Operator	12,000	1	12,000
Computer Operator	10,700	2	21,400
Data Conversion Supervisor	9,600	1	9,600
Secretary	9,600	2	19,200
Key Puncher	9,600	1	9,600
Input/Output Control Clerk	8,400	2	16,800
Documentation Clerk	8,400	1.5	12,600
Librarian	12,000	1	12,000
Coding Clerk	7,200	1	7,200
	Sub-Total	25	$338,000

Summary of Operational Costs (One Year)

Sample Hardware Cost sub-total	$348,471.00
Data Processing Staff sub-total.	$338,000.00
Overhead Cost sub-total.	$ 26,150.00
Total	$712,621.00

Schedule for Implementation. The research and development that will go on during the first five years of the project will entail the analysis and refinement of the data processing system, the writing of the application programs, and systems programming. Installation of the computer in early 1972 and acquisition of peripheral equipment are also considered to be part of the development stage.

The data processing effort will move gradually from research and development to production. A very little production (operational implementation) will begin as early as September of 1971. By 1974, over half of the developmental work will have been completed and an appropriate amount of staff time devoted to operating the system. After 1975, major development activity will have been completed; however, it is not anticipated that developmental work will cease. The activities described in this section are based upon the data processing requirements of WETEP as outlined at this time, but as with any five year projection there are areas of time and cost estimation that are necessarily vague.

(1) Software Development. The generation of the software needed to support the data processing requirements of WETEP constitutes a major portion of both development time and costs. Estimates for hardware include vendor software (operating system and standard language computers) at this time; however in order to achieve simultaneity of operation of all of WETEP's data processing tasks, it will be necessary to modify and expand some of the system software. The cost of these modifications has been included in the personnel estimate.

System programming expenses also encompass development of an appropriate tutorial tool for both CAI and CAT, and the interface with many multi-media terminals. The software requirements for these applications overlap, and for this reason, it is not possible to break out the expenditures for each in a modular fashion.

A vast amount of analysis and planning is required in the early stages of the project in order to make the various components mesh. Design and implementation of any one component without this analysis would either compromise the system as a whole or require a redevelopment of the first subsystem. The WETEP timetable indicates that computer-assisted instruction must be operational at the beginning of the second year. In order to meet the schedule for operational CAI and yet avoid duplication of effort in its development, WETEP will investigate the desireability of using a CAI system such as the RCA I-70 (currently being used for drill and practice in several school systems) until WETEP's own system has been selected and is ready in 1972. Two man/years of systems programming would be required to adapt I-70 to WETEP's needs. Development of the eventual system will go on while I-70 is being used.

The problem of meeting the implementation schedule arises only in the case of CAI. It is anticipated that the rest of the applications will be ready within the time frame required by WETEP.

(2) File Creation. A proposed schedule of file creation has been generated to indicate the chronological order and amount of time necessary to prepare the files necessary to support WETEP's major information-handling tasks. This schedule is shown in Figure 4. As discussed above, the conceptual approach inherent in developing the files necessary for the specified applications has been to generate an integrated file system. This approach--in contrast to a modular one--implies that the development of all files depends upon a master plan of systems analysis, in which the stage of development of any one file and its degree of completion can effect the development cycle of other files. Such an approach allows for maximum efficiency in file size and architecture by minimizing--and theoretically eliminating--redundancy of data.

(3) Staff Implementation. A schedule for implementing a data processing staff is given in Table XXVII. This schedule is predicted on the scheduled development of the Master Files shown in Figure 4, and indicates that staff implementation will begin with contract initiation (September 1970) and will include a total of 15 members by September 1971. The staff will increase to 28 by September 1972, to 32 by September 1973, down to 30 by September 1974, and will have decreased to 27 in September 1975. The permanent staff complement required for continuous operation beyond the contract period will be 25 as in the operational cost summary.

A maximal salary per year has also been estimated for the five years of the contract period. These values represent a reasonable estimate based upon present-day quotations for staff personnel with similar responsibilities and have been incremented at a rate of 6 per cent per year to compensate for cost-of-living and meritorious increase.

Development Costs. Total costs for the five year development period include hardware, hardware maintenance, personnel, and overhead. Although overhead represents the smallest of these components, it includes several important initial costs that warrant discussion.

In general, overhead costs can be broken down into three categories--facilities, supplies, and data conversion equipment. The facilities needed include a raised floor that will support equipment not exceeding 1000 pounds per castor or 125 pounds per square inch if mounted on legs, and about 20 tons of air conditioning equipment to safely service the central site. Initial supplies requirements call for twenty 11-platter disc packs (29.2 million bytes of storage each), two-hundred 2400-foot reels of 800 BPI,

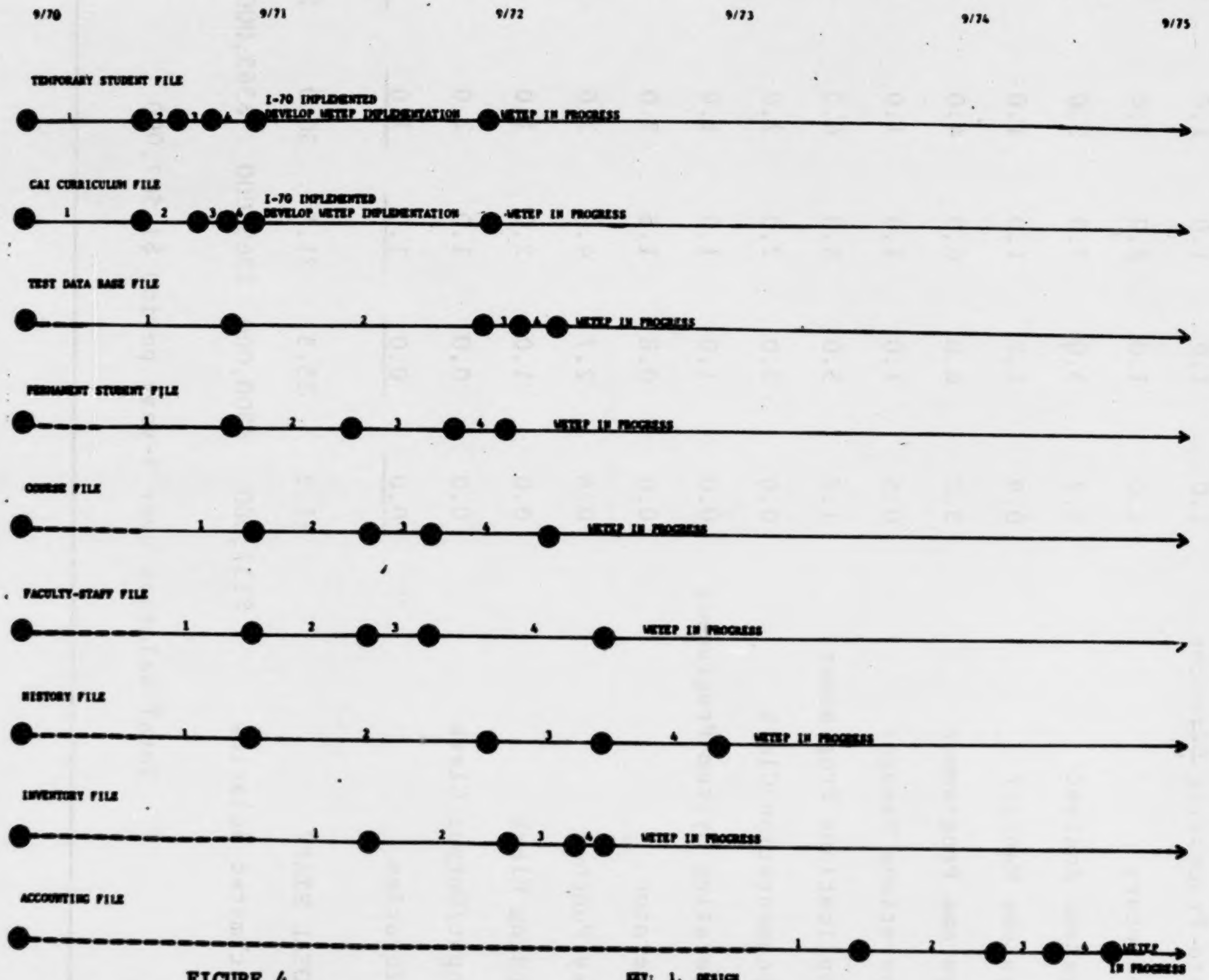

FIGURE 4
PERT CHART - FILE CREATION

TABLE XXVII

PERSONNEL NEEDS DURING DEVELOPMENT PHASE

Position	Year 1	Year 2	Year 3	Year 4	Year 5
Data Processing Director	1.0	1.0	1.0	1.0	1.0
Secretary	1.0	1.0	2.0	2.0	2.0
Systems Analyst	2.2	3.0	3.0	3.0	2.0
Systems Manager	0.9	1.0	1.0	1.0	1.0
Systems Programmer	3.2	6.0	6.0	4.0	3.0
Operations Manager	0.5	1.0	1.0	1.0	1.0
Applications Programmer	1.2	5.0	5.0	6.0	4.0
Documentation Clerk	0.6	2.0	2.0	2.0	2.0
Operating System Programmer	0.0	1.0	1.0	1.0	1.0
Operator	0.0	0.8	1.5	2.0	3.0
Key Puncher	0.6	2.7	4.0	3.0	3.0
Coding Clerk	0.0	1.0	2.0	1.0	1.0
Input/Output Clerk	0.0	0.0	1.0	2.0	2.0
Librarian	0.0	0.0	1.0	1.0	1.0
TOTAL STAFF	11.2	25.5	31.5	30.0	27.0
Estimated Salaries	$137,000	$300,000	$365,000	$365,000	$340,000

Total Salaries over 5-year period $1,507,000

9-channel magnetic tape, and miscellaneous supplies including computer paper, ribbons, and card stock at an approximate annual cost equal to one month rental of the hardware. Finally, for increased efficiency of data conversion, the "candidate" configuration calls for production material to be prepared for the computer on three key tape machines, and one keypunch to be included for the use of the programmers.

Initial overhead costs are broken down as follows:

Item		Cost
Flooring (@ $1400/sq. ft.)		$ 22,680
Air conditioning (including electrical cost)		14,000
Disc packs (@ $550 each)		11,000
Tape (@ $20 each)		4,000
Miscellaneous supplies (4 years)		96,000
3 Keytapes		24,900
Keypunch		3,600
	Sub-Total	$176,180

Sample Hardware Costs:

Hardware	Monthly Rental	Monthly Maintenance
Central Processor and A propriate Features	$13,683	$1,791.75
Magnetic Storage Devices	6,835	1,641.25
Input/Output Devices	1,762	661.25
Communications Interface	2,231	434.00
Sub-Totals	$24,511	$4,528.25

Personnel costs are included in Table XXVII.

Summary of Development Costs (Five Years)

Hardware - Central Site - monthly rental (45 months)	$1,102,995.00
Hardware Maintenance (45 months).	203,771.25
Personnel.	1,507,000.00
Overhead	176,180.00
Total	$2,989,946.25

Benefits

The benefits of the technological support systems for WETEP may be identified at a number of levels. WETEP students, elementary and secondary school personnel, educational researchers, and faculties in higher education may be expected to benefit from WETEP developments.

WETEP Students. WETEP facilities are designed to provide significant benefits to teacher education students in a variety of ways. Perhaps of most importance is the benefit derived from the assistance provided the individual student as he designs a personal program and is able to associate his personal needs in that program with both the technological resources available and the human resources, both faculty and other students, who can contribute to his own educational development.

The individualized nature of WETEP anticipates great variety in the sequence which students may follow within the WETEP program, in the selection of instructional modes and in the development of professional goals which they will pursue throughout their two years in the program. It is only through an effective instructional management system that such an individualized program is possible.

A second student benefit from these technological facilities is the efficiency with which students are able to obtain instructional resources such as films, audio materials and other instructional materials. Another benefit to be derived by students is ready access to observational facilities in a number of school settings. This will result in a clearer understanding of the relationship between theoretical work and its practical application to regular school settings.

Finally, the use of the mobile van units will provide students with the opportunity of selecting the school population with which they plan to do their intern teaching while at the same time maintaining close relationships with the faculty and staff on the University of Wisconsin campus.[1]

Elementary and Secondary School Personnel. The benefits to be derived by elementary and secondary school personnel are essentially of two kinds. First, elementary schools directly associated with the WETEP program will have an opportunity for close communication with the University of Wisconsin campus and WETEP through the telecommunications system available for work with intern students,[2] and for use of in-service education facilities which will be included as an integral part of WETEP. The second major benefit for elementary and secondary schools is represented by the implications of WETEP as an instructional system for elementary and secondary programs in terms of the utilization of technology and the support of human resources in a personalized education program.

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[1] Carl Personke, "The Role of the School," WETEP, Vol. I: Position Papers, School of Education, University of Wisconsin, Madison, Wisconsin, 1969, pp. 141-150.

[2] Charles D. Sullivan, et. al., "The WETEP Media and Telecommunication System," WETEP, Vol. I: Position Papers, pp. 95-102 .

Educational Researchers. The technological facilities anticipated in the WETEP design provide the benefit of making possible kinds of research not previously undertaken. Research efforts in education and particularly in teacher education have been hampered by lack of longitudinal studies, by lack of comprehensive data on subjects, and by restrictions placed on research because of emphases on traditional research design and statistics. The WETEP systems approach to monitoring student progress for the purpose of assessing the success of specific instructional modes and efforts make possible the constant evaluation of the effectiveness of instructional strategies with students of particular sets of characteristics. On-going evaluation of WETEP will be conducted for the purpose of improving the WETEP program. These same facilities, made possible because of the technological systems support, will provide research evidence which results in benefits both in research techniques within systems approaches and in the results of the studies undertaken in this context.

Higher Education. At the University of Wisconsin and on other campuses throughout the country there is much discussion of the need for improving personal relationships among faculty, staff, and students. The technological support systems within WETEP make it possible to anticipate a more frequent and effective student-faculty relationship which will have implications for higher education in a wide variety of disciplines.

The technological facilities will themselves demonstrate their utilization in programs of higher education. Equally important, however, will be the benefits derived from WETEP experience as faculty and staff learn to effectively utilize technological resources to meet with increasing effectiveness, the personal, instructional needs of students.

Summary

This report has identified the major facilities requirements for the implementation of WETEP. A careful analysis of instructional requirements has resulted in the delineation of space requirements and the technological resources which will be necessary to support the WETEP instructional program. Although many specifications have been formulated for the purpose of costing, specifications are presented in this paper as illustrative of both the manner in which specifications may be analyzed during WETEP development and the responses which might be made to those requirements as they are developed.

Benefits expected from the use of technological resources have been discussed in relation to the populations directly affected by the program. Benefit audiences range widely from students using the system to those institutions of higher education. The discussion of benefits relates the major facilities requirements to the basic objectives of WETEP, indicating the manner in which technological resources will facilitate personalized instruction.

FUTURE-PLANNING ON TEACHER EDUCATION IN WETEP

John M. Kean

The success of WETEP depends upon the ability of its faculty and students to keep the program relevant to the conduct of schooling and the condition of the American society. In order to both predict and to prepare for needed changes in the WETEP program, future-planning in teacher education is incorporated into the overall WETEP development and operational systems.

The staff will develop a future-planning unit to involve WETEP in operations similar to those being suggested for education as a whole but in this instance for teacher education specifically.[1]

The staff of the unit will attempt to predict current trends in teacher education and project their consequences for WETEP. It will also formulate desirable alternative futures and the educational inputs requisite for the development of teacher education programs. The staff will focus not only on American society in the mid 1970's but will be concerned continually with periods 10 to 20 years hence. They will develop procedures for: a) reviewing and synthesizing current literature in the field; b) examining projects and methods in existing futuristic centers; c) disseminating relevant findings, proposals and analyses to WETEP staff and cooperating agencies.

Relevancy

The lag between theory and practice in current teacher education programs has been due to isolation from the schools, fragmentation of the program, and uncoordinated specialization of teacher education personnel. As the character of schools and of the society which supports them has changed, teacher education has not made comparable concerted efforts to change. Not the least of the reasons for this was the relatively unnoticed futility created by trying to make piece-meal changes in programs as the result of outside political and technological changes. Rather than make decisions based upon an analysis of all the relevant data, we have sought "targets of opportunity," e.g., teachers for the culturally different, teachers for the handicapped, one new instructional analysis after another, the new math, linguistics and

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The author of this paper acknowledges with grateful appreciation the criticisms and suggestions of Dr. Fred Newmann of the Department of Curriculum and Instruction, University of Wisconsin, Madison, Wisconsin.

[1] The techniques are similar to those in the ORPHIC Design: a cluster of procedures based on the systematic use of coordinated expert opinion in education and in related disciplines for the purpose of: 1) exploring numerous possible educational futures, 2) selecting the best possible futures among them, and 3) developing models for helping achieve desired educational goals. See Harold G. Shane and June Grant Shane, "Future-Planning and the Curriculum," Phi Delta Kappan, XLIX, No. 7, March, 1968, p. 375.

television teaching. These "targets of opportunity" have resulted in teacher education specialists who delude themselves into thinking that the "war" is progressing nicely when in fact it is decidedly being lost.

Schaar and Wolin have asked two broad questions which provide some insight into our failure to make teacher education relevant. "Are they (the universities) succeeding in making knowledge something that can truly be shared? Are they realizing the goal of making knowledge power and hence a means of overcoming human powerlessness?"[2]

A stumbling answer to these questions would probably be a "yes, but . . ." There can be no answer to these questions short of true muckraking that does not involve using such qualifiers. Teacher education specialists have been dependent upon the initiative of individuals working in groups only loosely pointing toward the same goal--the educated human being capable of helping educate other human beings. Occasionally these groups have banded together to respond to the Paul Goodmans, the Edgar Friedenburgs, the John Holts, the Frederic Hofstaders and the Hyman Rickovers, but they in turn have always been responding to deficiencies of the past or in terms of generalized shadows that everyone recognized, but no one was able alone to do much about them. The question has always been about how to patch this tire to make it carry the load, not how do we build a better tire. The questions that WETEP has asked are what is a better tire, what does it consist of (never mind rubber, find the substance needed) and how do we build it?

Such questions can be asked from two points of reference: after the new tire is needed, or in anticipation of its need. The new "polyglas" tires were apparently produced long after their need had been demonstrated by the failure of current tires under modern driving conditions. WETEP is now designing its better tire, but at the same time is attempting to anticipate the modifications that will need to be made so that the needs-attainment record can be more efficiently and more reasonably handled. Such a goal can be met only by making continual analysis of the environment, the society, and the technology that might have effect upon teacher education programs.

Procedures

The major focus of the WETEP's Future-planning unit will be to provide the "think tank operation" necessary to the thoughtful, measured, and sustained attention to the teacher education programs of tomorrow.

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[2] John Schaar and Sheldon Wolin, "Education and the Technological Society," New York Review of Books, Vol. XIII, No. 6, Oct. 9, 1969, p.4

It should be emphasized here that the WETEP Future-planning unit is not intended to duplicate the work of Educational Policy Centers like those at Stanford and Syracuse but to provide the interface between such centers and the "modeling" process engaged in by the WETEP staff.

It is intended that the futuristics unit, with analysis and dialogue as its methods, make a unique contribution to the education of future teachers. The unit will look to the Educational Policy Centers at the Stanford Research Center and at Syracuse University, the Center for the Study of Democratic Institutions, the Hudson Institute, and any other groups which give attention to societal or other problems that affect education. Utilizing such information-processing groups as ERIC and the School Research Information Service (SRIS) of Phi Delta Kappa, the unit will attempt to synthesize material affecting teacher education or suggesting directions it might take. Hopefully, proposals based on criticisms and ideas of both American and international scholars will be used in guiding WETEP activities in the future.

The WETEP Future-planning unit will: 1) develop library references and files on analysis of the future relevant to teacher education, 2) analyze future-oriented projects in adult education, university education, teacher education for particular applications to elementary teacher education, 3) organize faculty colloquia on salient issues in the society at large or in teacher education particularly, 4) offer seminars on the future for students and WETEP staff, 5) plan and finance studies in the theoretical problems and in the actual implementation procedures of innovations in teacher education, 6) provide for visiting scholars, post-doctoral internships, and college faculty year-in-residence appointments, 7) publish the analyses and dialogue of the unit via suitable media such as newsletters, occasional papers, and audio tapes, 8) provide semester research and study leaves for WETEP faculty to examine the future of their particular elements with greater detail than is feasible when they are engaged full-time in teaching.

Benefits of Future Planning in WETEP

The benefit of such future-planning in WETEP is embodied in the slogan, "The Future Is Too Important to Be Left to Tomorrow." But more specifically, a future-planning unit will provide some basis for balancing the cumulative knowledge about the society and about schools and teaching which will make teacher education relevant for the future. Such planning will help to ensure that the educational pollution cited by Shane[3] (e.g., danger of subordinating human values to technological ones) will not be allowed to usurp the value contributions that can be made to the education of children by competently educated teachers.

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[3] Harold G. Shane and June Grant Shane, op. cit., p. 377.

The predictions for the future hold enormous potential for teacher education. "The One Hundred Technical Innovations Very Likely in the Last Third of the Twentieth Century" suggested by the staff of the Hudson Institute are a case in point. If only twenty-five per cent of these innovations come about, the world of education and consequently teacher education will have to make serious modifications in programs. For example, they suggest that the following will become available:

1) New techniques and institutions for adult education.

2) General use of automation and cybernation in management and production.

3) New and more reliable "educational" and propaganda techniques for affecting human behavior--public and private.

4) Practical use of direct electronic communication with and stimulation of the brain.

5) New techniques and institutions for the education of children.

6) Extensive use of robots and machines "slaved" to humans.

7) Chemical methods for improving memory and learning.

8) Mechanical and chemical methods for improving human analytical ability more or less directly.

9) Very low cost buildings for home and business use.

10) Inexpensive (less than $20) long lasting, very small battery operated TV receivers.

11) Maintenance-free, long-life electronic, and other equipment.

12) Home education via video and computerized and programmed learning.[4]

What, for example, will be the effect of chemical methods for improving human analytical ability? How will the work of teachers be modified because of it? Will some methods of instruction be unnecessary; will individuality be subverted? Will teachers need special emphasis in their education to help them avoid educating technological monsters?

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[4] Herman Kahn and Anthony J. Wiener, The Year 2000: A Framework for Speculation on the Next Thirty-Three Years, Macmillan, New York, 1967, pp. 51-55.

Will they need special skills to help them work effectively with children whose chemical balance makes them smarter, if not wiser, than they?

Or take, for example, the greatly reduced cost of buildings for education or the under $20 personal TV receiver. Will these innovations require teachers to develop new modes of working with space-age environments or will they have to adapt their instructional resources to visual media that is as handy as the transistor radio and the paperback book. What are the resource constraints when a child can use TV in the same way he now uses his radio? If, indeed, millions of dollars are spent in the next ten years for large complex machines, study carrels, etc., can their cost be justified against "soon-to-be available" miniaturized TV screens or home computers?

The WETEP Future-planning unit will provide the much needed information about possible alternative futures that will provide us with the information we need to determine current directions. The advanced planing made possible through future-planning provides the benefits of a continually relevant program at a reasonable cost which avoids excessive obsolescence.

RESEARCH POTENTIAL AND BENEFITS OF WETEP

Thomas C. Barrett

390/391/392

Introduction

The purpose of this paper is to delineate the research potential and benefits of Wisconsin Elementary Teacher Education Project (WETEP). To accomplish this objective, three questions will be dealt with. (a) What is the research potential of WETEP? (b) What are the expressed research interests of the WETEP faculty, as stated in the project documents? (c) What benefits will result from the potential WETEP research activities, and who will be the beneficiaries?

Before turning to the first question posed, it is important for the reader to recognize certain qualifications that must be applied to the remainder of the paper. These qualifications are:

1. The research categories and questions included in the second section of the paper are only illustrative of many research possibilities available to the WETEP faculty. The categories and questions are neither exhaustive nor definitive, since the authors of the documents from which they were drawn were not specifically charged with the task of focusing on the research possibilities. They are representative, however, of the research interests of the people involved in development of the WETEP proposal, and are indicative of the concerns the various authors have for contributing to the state of the art and science of the profession.

2. Although the area of measurement and evaluation is included in this paper, the reader should keep in mind that its importance to the implementation of WETEP is so significant that it will be treated in specific detail in another part of the economic analysis. It is included here to point up its importance in terms of the overall research potential and benefits of WETEP.

3. The research benefits and beneficiaries of WETEP are hypothetical in the sense that they are based on logical conjectures as to what and whom they might be.

Research Potential of WETEP

Much of the research literature in education, particularly that part which reports the results of comparative, methodological experiments, validates the significance of teachers' contributions to educational outcomes. Ironically, this body of literature has done little to stimulate teacher educators to investigate their instructional programs to see how teachers, at least beginning teachers, become what they are.

What are the reasons for this state of affairs in teacher education? Of course, there are many. Some are valid; others are rationalizations in the purist psychological sense. It seems appropriate to mention some of the reasons which appear to be valid before suggesting how WETEP may help to alter this state of affairs.

One of the reasons for the lack of data about students who have graduated from teacher education programs appears to be that most programs place limited emphasis on screening students prior to their entry into teacher education, monitoring them through a program, and following them up after completion of a program for feedback purposes. The reason for this seems to be that assessment procedures and instruments and the methods of managing and storing such data either have been unavailable, difficult to design, or unknown to teacher educators. In the case of the management and storage of descriptive data, alone, it is safe to say that teacher educators have barely scratched the surface in the use of computers for this purpose.

A second reason for the limited empirical data available concerning the influence of teacher education programs on their graduates is that such programs for the most part are not systematically designed. Most programs, for example, require all students to take a series of required courses in professional education. Once the required credits in the appropriate courses have been passed with an acceptable grade point average, a student is graduated and certified to teach. Unfortunately, the educators in charge of the programs rarely if ever know what specific learning experiences students have encountered in their course work; nor do they have a record of the competencies demonstrated by their graduates in even the most basic skills and abilities needed by an elementary teacher. The point here is that teacher education programs have been gross and have not used a systems approach based on behavioral outcomes.

Another reason for the lack of information about the influence of teacher education programs on their graduates has to do with their basic nature. In other words, teacher education programs for the most part have been and are static enterprises. Every student gets the same thing, in the same amounts and in the same way whatever it may be. Few, if any, programs provide the kind of flexibility that permits a student to select his professional specialty, modes for learning, rate of learning, and sequence of learning. Because static programs do not permit flexibility for individualization, there is limited empirical evidence that sheds any light on the effects different types of teacher education programs might have on teachers.

In contrast to the teacher education programs that have been and are available possessing the characteristics briefly described, WETEP is unique, for an integral part of its development and operation includes the provision for and facilitation of research on both the process and outcomes of teacher education. The research potential of WETEP is made possible and necessary because of a number of innovations.

First, WETEP will utilize a systems approach based on behavioral outcomes. Such an approach will, out of necessity, break down the traditional concept of courses and number of credits, because it will require more precision in stating behavioral objectives and in evaluating behavioral outcomes. The systems approach will require monitoring students as they proceed through the program and following them upon completion of the program so that students and faculty can make objective decisions about various facets of the program. Moreover, the systems approach will provide the data needed to conduct empirical investigations about the relationships between the learner and the program.

Second, WETEP will employ technology to facilitate the individualization of learning and ultimately the humanization of the educational process. Concurrent with this role, technology will facilitate research within the structure of WETEP. For example, the use of the computer will aid in the collection and storage of descriptive data detailing input and monitoring information on all students. Such data will be invaluable for comparative, longitudinal, predictive validity, and measurement investigations dealing with performance of students.

Finally, WETEP will place emphasis on individualization of learning. The flexibility of such an approach will permit comparative investigations of students who follow different courses of study leading to a variety of career goals. It also will permit comparative studies of students who have followed different courses of study leading to a variety of career goals. It also will permit comparative studies of students who have followed different courses of study, in terms of pacing, sequence, and modes of instruction, while working toward the same specialty. In general, the individualized nature of WETEP made possible by the use of technology and a systems approach will encourage a variety of empirical investigations utilizing independent and dependent variables which are critical to teacher education and to all education for that matter.

Research Interests Expressed by the WETEP Faculty

To provide support for the general argument that WETEP has a substantial research potential, an analysis of the available WETEP documents was conducted to locate the implicit and explicit research questions posed by the authors. Once the analysis was completed, the 120 questions that were isolated were evaluated, reduced in number, and organized into twelve research categories. Table I contains a quantitative summary of the results of this effort. Although a reading of Table I shows the breadth and depth of research interests of the WETEP faculty in a quantitative fashion, it should not be assumed that the number of research categories or questions are or will be restricted to those mentioned. In fact, it would be appropriate to assume that the contents of Table I represent a starting point for the research activities, once WETEP is implemented. To illustrate and support this observation, the quantitative summary in Table I includes only an illustrative sampling of the research interests of the faculty who authored the documents describing the elements of the teaching-learning component of WETEP, since their charge in preparing these documents did not include a focus on research. Nevertheless, it is safe to assume that the research categories and questions will be expanded considerably, once the faculty direct their attention to the implementation of their respective elements.

To provide a more complete picture of the research potential of WETEP as demonstrated by the interests of the faculty responsible for authoring the documents analyzed, Table II includes the research questions elicited through this analysis. As can be seen, the questions deal with both the process and the products of the program. They also range from fundamental inquiries about descriptive data to rather sophisticated and complex inquiries about the relationships of independent and dependent variables. Once again it must be stated that these questions only illustrate the research potential of WETEP; they by no means exhaust the potential. Their significance resides in the fact that they point up the research possibilities in a teacher education program which utilizes a systems approach and places emphasis on the utilization of technology and individualization of learning.

Benefits from WETEP Research

Probably the most crucial aspect of this paper is to determine the importance of various types of research proposed within the framework of WETEP as well as designating the beneficiaries of such research. Using the categories and questions presented in Table II, an effort was made to determine the people, programs, agencies, and institutions that would benefit from the research proposed by the WETEP faculty. Eight groups within the educational community were designated as potential beneficiaries: (a) students in elementary teacher education pre-service programs; (b) elementary teacher educators; (c) elementary teacher education in-service programs; (d) elementary school children; (e) elementary school staffs; (f) the United States Office of Education (USOE); (g) higher education in general; (h) the University of Wisconsin.

TABLE I

THE TWELVE RESEARCH CATEGORIES AND THE NUMBER OF QUESTIONS THAT ARE PERTINENT TO EACH CATEGORY AS DETERMINED BY AN ANALYSIS OF WETEP DOCUMENTS

Categories of Research	Number of Questions in Each Category
Screening and Selection	3
Retention and Feedback	6
Behavioral Objectives	5
Learning Variables	17
Media	6
Technology	4
Measurement and Evaluation	5*
Clinical and Laboratory Experiences	3
Teacher Effectiveness	9
Instructional Management	8
The University and the Public School	4
Faculty Roles	6
	76

*The measurement and evaluation category is included here to indicate its part in the research thrust of WETEP; however, it must be noted that the efforts in this category will in all likelihood equal the research efforts in the other 11 categories combined. For further clarification of this point see the paper by Ann Cleary and the proposed budget included in the Cost-Benefit Analysis Report.

TABLE II

SEVENTY-SIX RESEARCH QUESTIONS FOUND IN WETEP DOCUMENTS ILLUSTRATING THE RESEARCH POTENTIAL OF THE PROGRAM

1.0 Screening and Selection	2.0 Retention and Feedback	3.0 Behavioral Objectives
1.1 What information will be of value in screening candidates for an elementary teacher education program? (Yee, 1969, p. 56; Andersen and Cavanaugh, 1969, pp. 11-14)	2.1 What are the attrition rates for students of varying abilities and competence? (McCarty, 1969, p. 17)	3.1 In what forms must behavioral objectives be stated to give direction to the development of instructional modules, learner guidance, and assessment? (DeVault and Kean, 1969, p. 104)
1.2 How can information needed for screening and selection of candidates for WETEP be collected, recorded and stored? (Yee, 1969, p. 56; Andersen and Cavanaugh, 1969, pp. 11-14)	2.2 What is the student retention power of WETEP? (McCarty, 1969, p. 17)	3.2 How can students self-direct, self-pace, and self-select appropriate learning objectives? (DeVault and Kean, 1969, p. 104)
1.3 What estimates, in terms of probability statements, can be given for a student's success in WETEP at the time of selection? (Yee, 1969, p. 57)	2.3 What is the professional retention rate of teachers who graduate from WETEP? (McCarty, 1969, p. 17)	3.3 How are modules related to one another and to the design of the whole teacher education pro-

Table II continued

1.0 Screening and Selection	2.0 Retention and Feedback	3.0 Behavioral Objectives
		gram for achieving clear and certain objectives? How can these relationships be monitored and modified to reduce unnecessary overlap and redundancy of objectives within the program? (Yee, 1969, p. 52)
	2.4 How can a final, in-depth analysis of the students' capabilities and needs lead to recommendations for and from the novice teacher? (Yee, 1969, p. 61)	3.4 If higher level affective objectives, as designated in Krathwohl's Taxonomy, are to be achieved by students in WETEP, how must learning circumstances be altered? (Ammons, 1969, p. 81)
	2.5 How can continuing feedback be obtained to assess WETEP's long term influence on its graduates? (Yee, 1969, p. 62)	3.5 What levels of sophistication in terms of behavioral objectives, as categorized on Bloom's

Table II continued

1.0 Screening and Selection	2.0 Retention and Feedback	3.0 Behavioral Objectives
		Taxonomy, can and/or should students achieve in the elements and modules of WETEP? (Ammons, 1969, p.78)
	2.6 What effect do preliminary screening procedures have on the retention rates of students who begin WETEP? (McCarty, 1969, p. 17)	

Table II continued

4.0 Learning Variables	5.0 Media	6.0 Technology
What are the differential effects on WETEP students' short term learning and long term retention as a result of:		
4.1 The sequence of material according to type of learning and placement in a series of principles to be learned?	5.1 What are the relative contributions to learning of different media and the teacher when used in various combinations? (Kean and Sterner, 1969)	6.1 What kinds of tasks within the total instructional system can best be assigned to a technological facility? (DeVault and Kean, 1969, p. 105)
4.2 The knowledge of correct responses?	5.2 What are the relative effects of various methods of using objects in given types of learning situations? (Kean and Sterner, 1969)	6.2 What will student reaction be to long-term study by CAI as opposed to CAI in a single course? (Kean and Sterner, 1969)
4.3 The amount and distribution of prompting?	5.3 What are the characteristics of three-dimensional materials which make them more effective than other aids in given types of learning situations? (Kean and Sterner, 1969)	6.3 Can methods be designed for efficient writing and development of programs, permitting more rapid adaptation of material to the CAI format? (Kean and Sterner, 1969)

Table II continued

4.0 Learning Variables	5.0 Media	6.0 Technology
4.4 The types of response modes used?	5.4 What is the educational value of pictorial illustrations, including the kinds of content best communicated by still pictures? How can they best be used? (Kean and Sterner, 1969)	6.4 Is the computer psychologically damaging to some students, and if so, can this be overcome? (Kean and Sterner, 1969)
4.5 The use of hardware versus software?	5.5 What is the educational value of audio tapes? How can they best be used? (Kean and Sterner, 1969)	
4.6 The pacing of a program in relation to individual differences?	5.6 What is the relative effectiveness of still pictures, motion pictures, television, audio recording, programmed instruction, printed material, three-dimensional material, simulation, etc. for different types of learning? (Sullivan, Ames, Iverson, and Ghattas, 1969, p. 96)	

Table II continued

4.0 Learning Variables	5.0 Media	6.0 Technology
4.7 The step-size in relation to the amount of material to be presented at one time?		
4.8 Massed versus spaced distribution of practice?		
4.9 The type and distribution of reinforcement?		
4.10 The distinctiveness of discrimination stimuli?		
4.11 The meaningfulness of learning tasks as related to time required for learning, forgetting, and generalization effects? (Kean and Sterner, 1969)		

Table II continued

4.0 Learning Variables	5.0 Media	6.0 Technology
4.12 What are the utility and validity hierarchies of learning and transfer of knowledge? (Kean and Sterner, 1969)		
4.13 What learning principles provide the greatest potential for structuring and assessing the returns from student effort in the WETEP approach? (Kean and Sterner, 1969)		
4.14 How can situations be created that will expose students to values in action so they can learn through identification with a model? How can such learning be seen in actions, not just in verbalizations? (Ammons, 1969, p. 80)		
4.15 In what ways do WETEP teachers differ from each other with regard to sequences of educational experience? (Czajkowski and Kean, 1969)		

Table II continued

4.0 Learning Variables	5.0 Media	6.0 Technology
4.16 In what ways do WETEP teachers differ from each other with regard to time spans spent in various preparation experiences? (Czajkowski and Kean, 1969)		
4.17 In what ways do WETEP teachers differ from each other with regard to choices opted for in their individualized preparation programs? (Czajkowski and Kean, 1969)		

Table II continued

7.0 Measurement and Evaluation	8.0 Clinical & Laboratory Experiences	9.0 Teacher Effectiveness
7.1 How can tests be tailored to each student's ability level, educational history, and educational goals? (Cleary, Linn, and Rock, 1969, p. 111)	8.1 How can teacher effectiveness be ascertained through use of microteaching and videotaped feedback that consider both the teacher's awareness of the rationale for his behavior and his technical training? (Czajkowski and Kean, 1969)	9.1 How can appropriate roles for teachers who will provide personalized attention to individual students be determined, developed and evaluated? (WETEP Staff, 1969, p. 22)
7.2 What are the effects of the testing method on student attitude and motivation? (Cleary, Linn, and Rock, 1969, p. 110)	8.2 What should be the length and character of the internship for different specialties? (DeVault and Kean, 1969, p. 106)	9.2 How can criteria for measuring teacher effectiveness also be concerned with ascertaining whether or not a teacher is able to explain the rationale for his behavior situation? (Czajkowski and Kean, 1969)
7.3 How can non-projective, non-obscure and valid measuring devices be developed which reveal the degree of a trait in the student rather than just indicating "shows trait" or "does not show	8.3 How can micro-criteria of effectiveness be tested in terms of technical skills observable within the micro-teaching situation? (Czajkowski and Kean, 1969)	9.3 How can WETEP help future teachers examine their attitudes toward subjects and children and help them change these attitudes in one direction or another? (Czajkowski and Kean, 1969)

Table II continued

7.0 Measurement and Evaluation	8.0 Clinical & Laboratory Experiences	9.0 Teacher Effectiveness
trait?" (Kean and Ubbelohde, 1969, p. 91)		
7.4 What are the relative merits of various structures of sequential tests, items, and response types afforded by computer assisted testing? (Cleary, Linn, and Rock, 1969, p. 112)		9.4 Does an individually prescribed teacher education program produce teachers who differ from those prepared in programs where experiences are basically similar and ordered in like manner for all students? (Czajkowski and Kean, 1969)
7.5 What is the validity of simulated problem-solving tests in which items are scored according to the quality of the methods of solution and the series of non-solution responses? (Cleary, Linn, and Rock, 1969, p. 129)		9.5 How do WETEP teachers differ from other teachers in terms of process, e.g., classroom interaction, and product, e.g., pupil achievement variables? (Czajkowski and Kean, 1969)

Table II continued

7.0 Measurement and Evaluation	8.0 Clinical & Laboratory Experiences	9.0 Teacher Effectiveness
		9.6 Are WETEP teachers more likely to individualize instruction for their pupils than teachers who are prepared in programs that afford little individualization of instruction? (Czajkowski and Kean, 1969)
		9.7 Do students with particular academic profiles based on continual assessment operate more effectively in specific kinds of teaching-learning situations? (Czajkowski and Kean, 1969)
		9.8 Do patterns of development evidenced by observations of individual students over time show predictive validity when the criterion is teacher effectiveness? (Czajkowski and Kean, 1969)

Table II continued

7.0 Measurement and Evaluation	8.0 Clinical & Laboratory Experiences	9.0 Teacher Effectiveness
		9.9 Do students with certain personal and academic characteristics teach more effectively in certain situations than in others? (Czajkowski and Kean, 1969)

Table II continued

10.0 Instructional Management	11.0 The University & the Public Schools	12.0 Faculty Roles
10.1 Can technology be used in a way which frees the instructor for more meaningful faculty-student relationships? (DeVault and Kean, 1969, p. 105)	11.1 In the joint participation in the formulation of programs for pre-service teachers, in-service teachers and elementary school children, how would the roles of each group be defined so each group could make its maximum contribution? (Ammons, 1969, p. 84)	12.1 How can new administrative structures and personnel roles be developed to provide better educational programs and avoid possible contradictions in objectives and role conflicts? (Yee, 1969, p. 51)
10.2 How can the flexibility in program development be enhanced through the utilization of technological resources? (DeVault and Kean, 1969, p. 105)	11.2 In what kind of university-school organization can in-service education as an adjunct to teacher education be most effective? (DeVault and Kean, 1969, p. 106)	12.2 What role might T-groups or sensitivity training have in personalizing and making effective relations between students and professors? (Kean and Ubbelohde, 1969, p. 91)
10.3 How can multi-media and computerized instructional facilities aid in developing routes through the teaching-learning component for individuals? (Yee, 1969, p. 59)	11.3 Which of several kinds of university-school relationships are most useful to the University and to the schools? (DeVault and Kean, 1969, p. 106)	12.3 What is the feasibility of various faculty roles within WETEP, e.g., guidance, models, etc.? (DeVault and Kean, 1969, p. 106)

Table II continued

10.0 Instructional Management	11.0 The University & the Public Schools	12.0 Faculty Roles
10.4 What methods can be developed to monitor students' progress, including the potential ability to direct students to certain experiences? (DeVault, Golladay, and Yee.)	11.4 What sort of regular, systematic, and short-term exchange of teaching opportunities between campus and public school personnel would best be able to translate new knowledge into both pre-service and in-service training? (Ammons, 1969, p. 85)	12.4 What types of contact do students in WETEP want with the faculty? (DeVault and Kean, 1969, p. 106)
10.5 How can information from University records be incorporated into the decision-making procedures for and by individual students? (Cleary, Linn, and Rock, 1969, p. 110)		12.5 What will be the nature of faculty-student contact within WETEP? (DeVault and Kean, 1969, p. 106)
10.6 Do students with particular personal profiles operate more effectively in specific kinds of teaching-learning situations than students with different personal profiles? (Czajkowski and Kean, 1969)		12.6 Which elements of any part of WETEP should be dealt with through man-machine technology or through human interaction? (Kean and Ubbelohde, 1969, p. 90)

Table II continued

10.0 Instructional Management	11.0 The University and the Public Schools	12.0 Faculty Roles
10.7 How can a computer use compiled information about individual background, abilities, interests and learning style to identify tentative goals for each child, and to propose learning experiences to achieve these goals? (WETEP Staff, 1969, p. 23)		
10.8 What effect does the total learning environment have upon teachers' competence? (DeVault and Kean, 1969, p. 103)		

Obviously not all of these potential beneficiaries will receive equal contributions from all the types of research proposed; therefore, an intuitive study of the proposed research categories and questions and their potential contribution to the designated beneficiaries was pursued. This study involved reading the questions in each of the twelve research categories presented in Table II. Once all the questions in a single category were read, a benefit rating was placed after each of the potential beneficiaries of the research. The ratings were: 3 if the research questions posed would be of "considerable benefit" to a beneficiary; 2 if they would be of "some benefit;" 1 if they would be of "little benefit;" 0 if they would be of "no benefit." The results of this subjective analysis are presented in Table III.

Without exceeding the limits of the data available, it would appear that the array of ratings presented in Table III provides a basis for a number of tentative observations:

1. Elementary teacher education pre-service programs and elementary teacher educators would derive "considerable benefits" from the proposed research in all twelve of the research categories.

2. Elementary teacher in-service programs, elementary school children, and elementary school staffs would receive "some to considerable benefits" from research in eleven of the twelve categories. The one exception was the screening and selection category which provided a "little benefit" rating for these three beneficiaries.

3. The research benefit ratings for the USOE, Higher Education and the University of Wisconsin were mixed across the twelve research categories, although it appears that USOE would profit more than the other two agencies in general.

4. The research proposed within three of the categories, i.e., Media, Technology, and Measurement and Evaluation, received a "considerable benefit" rating for each of the eight potential beneficiaries cited.

5. Three other types of proposed research, i.e., Learning Variables, Instructional Management, and Faculty Roles, produced "some or considerable benefit" ratings across the eight beneficiaries.

6. The remaining six categories of research had ranges of benefit ratings from "no benefit" or "little benefit" to "considerable benefit" across the eight beneficiaries.

TABLE III

RELATIVE BENEFITS OF THE TYPES OF RESEARCH TO BE CONDUCTED WITHIN WETEP FOR EIGHT POTENTIAL BENEFICIARIES

Beneficiaries of WETEP Research	Potential Types of Research and the Benefit Ratings for Each of the Eight Beneficiaries											
	Screening and Selection	Retention & Feedback	Behavioral Objectives	Learning Variables	Media	Technology	Measurement and Evaluation	Clinical Experiences	Teacher Effectiveness	Instructional Management	University & Public Schools	Faculty Roles
Elementary Teacher Education (Students in Pre-service Programs)	3	3	3	3	3	3	3	3	3	3	3	3
Elementary Teacher Educators	3	3	3	3	3	3	3	3	3	3	3	3
Elementary Teacher In-service Programs	1	2	3	3	3	3	3	3	3	3	3	3
Elementary School Children	1	2	2	2	3	3	3	2	3	2	2	2
Elementary School Staffs	1	2	2	2	3	3	3	2	3	3	2	3
USOE	1	1	2	2	3	3	3	2	2	2	1	2
Higher Education	0	0	1	2	3	3	3	1	1	2	1	2
University of Wisconsin	2	1	1	2	3	3	3	1	1	2	1	2
TOTAL BENEFIT RATING	12	14	17	19	24	24	24	17	19	20	16	20

Key to Ratings:
3 = Considerable Benefit
2 = Some Benefit
1 = Little Benefit
0 = No Benefit

On the basis of the analysis of the research benefits and beneficiaries of WETEP, three conclusions appear to be warranted. First, the potential WETEP research will be beneficial across the educational community, for it appears that eight of its member groups stand to derive substantial profits from it. Second, students in elementary teacher education pre-service programs and elementary teacher educators, as one might expect, stand to benefit the most from the overall research efforts within WETEP. Finally, the proposed research within the media, technology, and measurement and evaluation categories will, it appears, be of "considerable benefit" to all groups within the educational community, while the proposed research in the areas of learning, instructional management, and faculty roles will almost be as universally worthwhile.

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